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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

JAMES W. WHITE, M.D., D.D.S.
(January to June.)

EDWARD C. KIRK, D.D.S.
(July to December.)

Observe, Compare, Reflect, Record.

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THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

THE MANAGEMENT OF ENAMEL MARGINS.

BY G. V. BLACK, M.D., D.D.S., JACKSONVILLE, ILL.

THERE is perhaps no subject more important to the operative dentist than the management of the enamel margins. On his knowledge of the physical properties of the enamel, of its strength, of the causes and directions of its weakness, and on his judgment and skill in making the most of the strength it possesses, will depend much of his success in saving teeth. Perhaps most dentists have learned what they know of this subject from observation at the chair. While all must bow to the old maxim, "Experience is the best teacher," I have seen many examples in which the price paid by both operator and patient for the experience at the chair has seemed exorbitant, and which persuade me that a much greater amount of the first experience should be obtained elsewhere. The most appropriate time and place for this first study is in the class in operative technics as now organized in some of our dental schools, and which ought to be a feature of all. Here the study can be systematized, not only in the form of lectures, from which the student gains but shadowy notions even from the best-framed sentences descriptive of physical attributes, but also by taking the teeth and instruments into his own hands and studying the subject in a practical way under the guidance of a skilled teacher. However, those who have passed the schools without this training—and very many have—must obtain it at the chair or in their own laboratory. To all of these a systematized plan of study would be of great advantage, while many of the older members of the profession will gain clearer ideas of the subject by careful perusal of a clear statement of the principal facts.

In what I have to say on this subject, my effort will be to group the known facts in regard to the enamel and point out their bearing on our daily operations, rather than relate new discoveries.

Physical Properties of the Enamel.

In the study of the enamel to the single end of developing the best means of managing the margins of carious cavities, the principal inquiry is directed to its physical properties. In order that these properties may be best understood, an intimate knowledge of the elementary parts of the enamel, their forms, and their arrangement in the composition of the mass, is essential. It is also essential that the arrangement of these toward other tissues to which they stand related be well understood. Certain features of the formation of the enamel must be studied, in order to understand the faults habitual to certain of its parts and the peculiarities of its weakness on certain lines. Otherwise than this, the embryological processes by which the enamel is formed are not important to our present purpose, and will not be discussed.

The enamel covers all portions of the tooth normally exposed, as the skin envelopes the other tissues. Its uses are similar; but the teeth are used as a mill for grinding food, and are subjected to severe abrasion. The enamel, which must resist this abrasive action, is the hardest tissue of the body, and also has an arrangement of its form elements calculated to enable it to resist abrasion and bear severe strain exerted upon its surface. When its continuity is broken by a carious cavity, or by violence, the question of the best mode of repair by artificial means is most effectually studied, in the first instance, by noting the arrangement of its form elements upon the margins of the break. By this means we are able to so form the margins that they will be best able to withstand further disintegration, whether by acts of violence, as in the condensation of filling-material against them, in mastication, or by the attacks of corrosive agents.

The form elements of the enamel are so small that it is impracticable to study them with the naked eye, and therefore the microscope must be brought into use. But after they become familiar by this method of study, the practical points affecting operative procedures are readily determined without the microscope, especially by noticing the behavior of the margins before edged tools.

The enamel is composed of crystalline rods* held together by a cementing substance which combines all into a solid mass.

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* These have been termed enamel-rods, enamel-fibers, enamel-prisms, and enamel-crystals by different histologists, and all of these terms refer to the same thing.

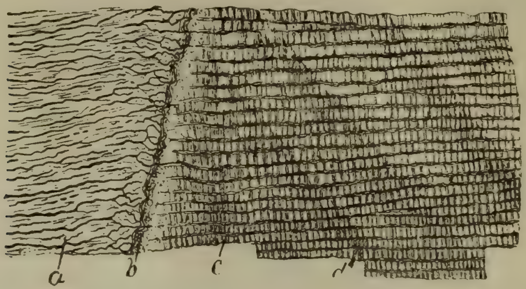
The enamel-rods are placed together in a fairly definite form in relation to one another, and to the mass of the dentine composing the crown of the tooth, though some variations from regularity may be noted. They are always placed with their ends upon the dentine, and the length of the rods extends to or toward the surface of the enamel. Generally their length is nearly perpendicular to the surface upon which they rest, but in the irregular forms of the crowns of the teeth there are many deviations from the perpendicular line. These are important, and will be noted later on. The course of the rods from the surface of the dentine to the surface of the enamel may generally be regarded as direct, though they are seldom exactly straight. In most specimens there is more or less curvature of the rods, which gives them a slight wavy appearance. In addition to this, there is an inclination to a spiral form, which is often considerable, by which groups or bundles of rods are twisted about their neighbors, and more or less interlocked. This varies greatly in different specimens. In some the rods are almost straight, while in others they are much twisted and interwoven. The former is most often met with in regularly formed incisors, while the best specimens of the latter are found in the molar teeth.

The enamel is translucent, and in thin sections suitable for microscopic study it is nearly transparent; and the substance intervening between the rods has so nearly the same refractive power on light as the rods themselves that it is difficult to see them clearly. In this respect much advantage may be gained by the use of certain reagents; especially those acids (hydrochloric acid, lactic acid) which dissolve the intervening substance more readily than the rods, and thus bring them into view. By this means the course of the individual rods may be clearly seen.

The enamel-rods are solid bodies of crystalline appearance. The size is not uniform, and at very short intervals there are cross-markings at which they seem slightly reduced in size (Fig. 1). The apparent cross-markings seem to depend upon irregular swellings and constrictions of the rods. These vary greatly in different specimens, some scarcely showing them at all.

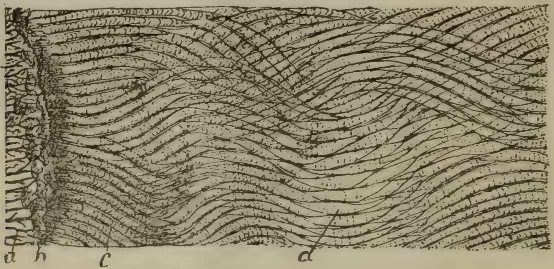
Fig. 1 is an illustration drawn from regularly formed enamel from the labial surface of a central incisor, and shows the cross-markings unusually well. In this instance the enamel-rods are almost straight from the surface of the dentine to the surface of the enamel, and a point has been chosen where the section is parallel with their length in order to display them to the best advantage. The irregular swellings and constrictions of the rods are especially well seen in the pigmented portions running across the specimen in diagonal lines or bands. This pigmenting occurs often in human enamel, from what cause is not clearly known. The lines of pigmentation usually follow the lines of contemporaneous formation, so that I suppose the pigmentation occurs at the time the enamel is formed, and that it is permanent. In most instances the pigment is confined to the cementing substance between the rods, but unless the sections be very thin the rods are clouded by shadows. In my studies of the enamel I have failed to discover that pigmented enamel is otherwise less perfect than enamel free from pigmentation.

FIG. 1.



a, **dentine;** ***b***, **junction of dentine and enamel;** ***c***, **enamel;** ***d***, **band of pigmentation.**

FIG. 2.

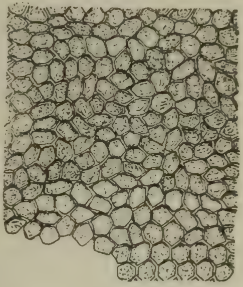


a, **dentine;** ***b***, **junction of dentine and enamel;** ***c***, **enamel;** ***d***, **enamel-rods cut diagonally.**

In Fig. 2 I present an illustration of enamel from the buccal surface of an upper first molar, in which there is much twisting and interlocking of the rods, and several marked curves are noted in their course. It will also be noted that the cross-markings of the rods are much less distinct than in Fig. 1. These two figures, 1 and 2, illustrate fairly the extremes of diversity of the forms of the enamel-rods in different specimens of well-formed human teeth. The one specimen is perhaps as perfect enamel as the other, though that of Fig. 2 is the stronger. Both are taken from well-formed teeth, free from irregularities of structure and presenting smooth surfaces.

Fig. 3 is from a cross-section of the enamel-rods. In this specimen the cementing substance has been partially dissolved out from between the rods by weak hydrochloric acid, in order to display them to better advantage. It will be seen that the ends of the rods do not present true hexagons. While the hexagon is regarded as the typical form, it is not strictly adhered to, but rather the rods seem to take such form as will best fill out the space between them when irregularly crowded together. Often we will find a number lying in a straight row, or it may be several rows superimposed upon one another, and these are usually hexagonal. More generally they are irregular, and the forms are irregular. Indeed, the perfect hexagon is the exception rather than the rule.

FIG. 3.

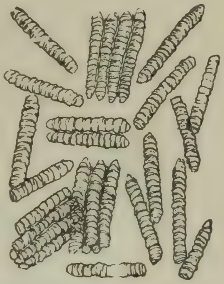


Cross-section of the enamel-rods.

ACTION OF ACIDS UPON THE ENAMEL.

I have said that in the specimen from which Fig. 3 was made the enamel-rods were rendered more apparent by the partial solution of the cementing substance by an acid. This is an important fact, as it denotes a difference in the composition of the cementing substance and the rods themselves. This difference in solubility is such that by working slowly and carefully we may take the rods apart by dissolving out all of the cementing substance. Fig. 4 is an illustration from rods separated in this way, using for the purpose a moderately thin cross-section. The cross-markings are rendered more apparent at first, but are likely to become indefinite if the action of the acid is too long continued, and the entire rods will be dissolved if the action of the acid is not stopped. In our illustration the ends of the rods are reduced in size, or rounded by partial solution.

FIG. 4.

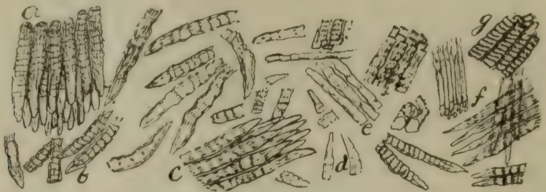


Enamel-rods separated by hydrochloric acid.

This difference in the solubility of the enamel-rods and their cementing substance has a special bearing upon the management of enamel margins, for the reason that it represents the mode of attack of corrosive agents which we are endeavoring to shut out by filling the cavity. Whenever a rod or a group of rods is loosened in condensing the filling-material, or falls away from the margin, a breach has been made favorable to the beginning of caries. Not only this, but the corrosive agent may begin its action in the midst of the enamel instead of beginning at the outside.

In caries of the teeth, disintegration of the enamel occurs in precisely the same fashion as when the rods are separated by a weak acid; that is, by the solution of the cementing substance and the loosening of the rods, which then fall apart or break away. To illustrate this, take a tooth that is extensively decayed, so that some considerable part of the enamel has only softened dentine lying against it. Break away a portion of this, and the inner surface of the piece has a whitish appearance, and a portion of its thickness is easily scraped away with an excavator. Take up a portion of this chalky material on the point of a spoon-shaped excavator, and convey it to a globule of glycerine (glycerine jelly is better), which has been placed on the center of a glass slide. Break up the little mass by a few strokes of the excavator, and lay on a cover-glass. An examination with a half-inch lens will show the mass to be composed of enamel-rods which have been separated, or partially separated, by solution of their cementing substance.

FIG. 5.



Enamel-rods from carious dentine.

Fig. 5 is an illustration made from such a specimen, selecting the more perfect rods. Scattered over the field all kinds of broken fragments, masses of micro-organisms, and débris will be seen; but among these many individual rods, or small masses of rods, in varying lengths will be found. These usually show their cross-markings plainly.* If the disintegration has been but slight, they will generally have one end rounded or pointed and the other broken squarely off, as at *a* and *c*, in Fig. 5. The rounded ends are those that have been most exposed to the solvent, while the square ends were broken away from the deeper part. This is a kind of specimen that is easily prepared, and the study of it will give a fair conception of the manner of the disintegration of enamel by caries. It cannot well fail to enforce the conviction that before corrosive agents there is a very practical difference between the substance of the enamel-rods and the substance by which they are united.

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* Since writing this paper I have noticed that Dr. W. D. Miller speaks in similar terms of the difference in the solubility of the enamel-rods and the substance by which they are united ("Microorganismen der Mundhöhle," Seite 133; also page 169 edition in English, published by The S. S. White Dental Manufacturing Co.).

This illustration is taken from the inner surface of the enamel, for the reason that in this position the process of disintegration is not disturbed by mechanical agencies ; and it is therefore easy to find good specimens of the partially disintegrated rods. The process is the same, however, upon the outer surface, and is liable to occur at any point which favors the lodgment of débris to undergo acid fermentation. An enamel margin against which a filling is placed should always be considered a weak point, and therefore removed whenever possible from the danger of such lodgments. The manner of doing this will be discussed in another paper.

FIG. 6.

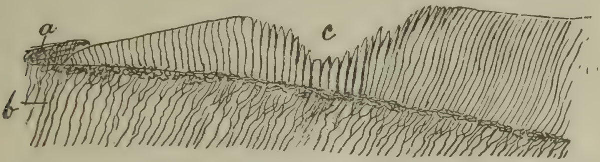

Diagram illustrating the beginning of caries on the labial surface of a central incisor. *a*, cementum overlapping the gingival margin of the enamel ; *b*, dentine ; *c*, beginning of caries, showing the enamel-rods separated by solution of cementing substance and partially broken away.

In Fig. 6 I present a diagram* illustrating the beginning of caries on the surface of the enamel. For this purpose I have chosen the labial surface of a central incisor near the gum, where we so often find little cavities starting in the smooth enamel. The cementum lapping over the gingival margin of the enamel is shown at *a*. By this the margin of the enamel is "heeled in," much as the margin of a stone or brick pavement is heeled into the ground or confined by a curbstone. *b* is the dentine. At *c* the effects of disintegration upon the enamel are represented. Here the cementing substance is dissolved out from between the rods, and the free ends of the rods dissolved or broken away until in the central portion of the depression some of their inner ends are ready to fall away, leaving the dentine exposed. In the position we have named these little pits are not rare ; and in carefully grinding sections of freshly extracted teeth they may often be shown to be as abrupt as represented in the diagram.

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* It is necessary here to use diagrams, for the reason that an accurate picture of the whole thickness of the enamel with the rods large enough to be seen clearly would occupy too much space. The attempt to do this reminds me of the effort of a student whom I once set to drawing a certain portion of dentine in a lengthwise section of a cuspid with a thousand-diameters amplification. He succeeded fairly well, and, becoming enthusiastic, declared he would go to the stationer's and get a large piece of paper, and by moving from point to point make a picture of the entire section. I asked him to figure out the size of his picture first. When the result of his figuring showed that his picture would be ninety-five feet long, he gave it up.

But it is to the next diagram, Fig. 7, that I wish to call more particular attention. This represents the same subject after the decay has made some advance in the dentine. *d* shows the carious dentine with its expanded tubules reaching into the substance of the tooth in the form of a broad cone. But the important point pertaining to the present discussion is the manner in which the carious process penetrates between the enamel and dentine shown at *e*, *e*. This is an almost constant characteristic of caries, and a point of vital importance in the preparation of enamel margins. Almost immediately caries has penetrated the enamel the tendency is to spread laterally between the enamel and dentine, while it penetrates the latter in this conical form. The undermining of the enamel is probably from two causes: First, because the dentinal tubules communicate freely with one another by side-branches, just as they are about reaching the enamel, and there are generally many small interglobular spaces in the dentine near the enamel, both of which admit corrosive agents readily; second, because the substance uniting the enamel and dentine is probably more readily soluble. But whatever the reason may be, the fact of this direction of the progress is sufficiently clear. The enamel is generally deeply undermined, and then it decays from the inside toward the outside. Dr. Miller terms this "secondary caries of the enamel" ("Micro-Organisms of the Human Mouth," page 169). Much that is perfect on the outside is not only undermined, but is also weakened by partial solution of the cementing substance from between the rods. Therefore in the preparation of enamel margins it is necessary that this fact be carefully considered in each case, and the decay

FIG. 7.

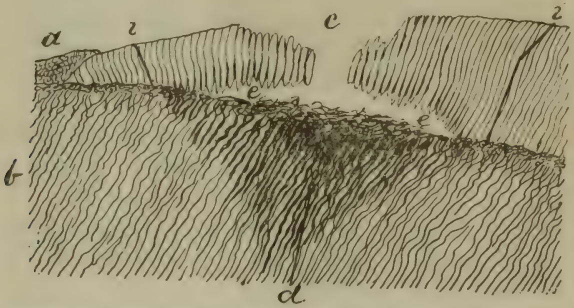


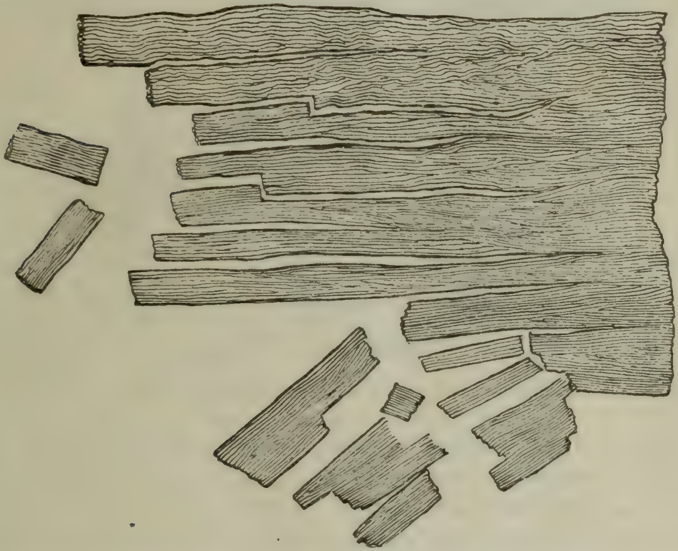
Diagram representing caries in the labial surface of a central incisor at a later stage than in Fig. 6. *a*, cementum; *b*, dentine; *c*, breach in the enamel; *d*, caries in the dentine, with the expansion of the tubules reaching toward the central part in the form of a cone; *e*, *e*, extension of the carious process between the dentine and enamel; *i*, *i*, lines upon which the margins of enamel should be formed in preparing for filling.

followed out until the enamel margin is found to rest on solid dentine. The points relative to the caries to which the enamel should be cut in order to do this are shown by the lines *i*, *i*, Fig. 7. Any less cutting would leave the dentinal ends of the enamel-rods without support. Whether in a given case it may be well to remove the carious portions and fill in the undercut, depending upon the strength of some portion of unsupported enamel, must be determined by the circumstances and special necessities. In certain cases the risks of breakage may not outweigh other considerations ; but the enamel margin will not have the same strength that it would have if it rested on the dentine.

CLEAVAGE OF THE ENAMEL.

The enamel has definite lines upon which it breaks, or splits, easier than in other directions. These are called its lines of cleavage. These lines are determined by its structure, and depend upon the fact that the enamel-rods separate from one another easier than they break. This occurs, seemingly, because the cementing substance is weaker than the rods. The cleavage of the enamel is therefore in the direction of the length of the enamel-rods. Fig. 8 is an illustration of this, drawn from a fragment fortunately obtained by shattering a section cut parallel with the rods by a blow from a blunt instrument. In order to present the fragment entire it has been drawn with a low

FIG. 8.



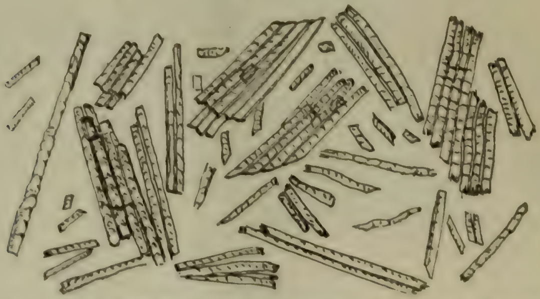
Broken section of enamel, showing the lines of cleavage to be parallel with the enamel-rods.

power of the microscope, with which the rods appear as fine lines. An examination of the illustration will show how strong the tendency is for the lines of fracture to follow the enamel-rods. In this little fragment there are six lines of fracture running close together for a considerable distance, relatively to the size of the enamel-rods, and along all of them not more than a dozen rods have been broken across. In the smaller fragments the tendency of the fracture to follow the length of the rods is equally shown. The number of square ends seen in the fragments suggests also that the rods break square across more easily than diagonally; but no considerable cracks occur in this direction.

Most persons who have ground even a few sections of enamel have noted this tendency in the breakage of their sections while grinding; for such fractures along the lines of the enamel-rods render the grinding of any particular portion of the enamel difficult.

Again, if we delicately pare or plane a smooth surface of enamel with a sharp chisel, holding its edge parallel with the rods, and mount

FIG. 9.

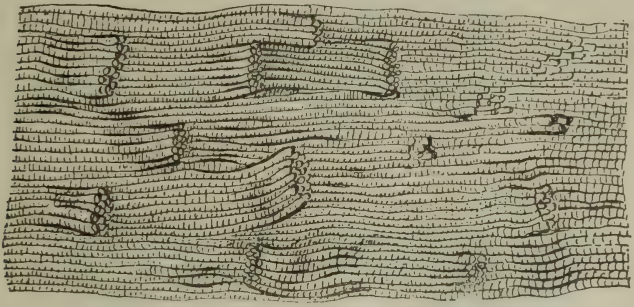


Parings from enamel made with a sharp chisel, holding its edge parallel with the enamel-rods.

the material thus obtained for microscopic examination, we find a further illustration of the mechanical separation of the rods. Fig. 9 is prepared from such a specimen. Here we see the strong tendency of the rods to separate from one another. Many single rods of considerable length are found among a variety of fragments; and the little flakes of two or three or a dozen rods all show the cementing substance to be weaker than the rods, and that the break results in a separation along their lines of junction.

Another very excellent mode of studying enamel cleavage is by means of the split section. First split the tooth (or several may be required to obtain a satisfactory section), and obtain a flat, straight fracture of the enamel. Fasten this to a glass with stiff Canada balsam. Then grind the opposite side until the section is thin enough for examination by transmitted light, and polish. Dissolve the balsam with chloroform, turn the section split side up, and mount in balsam. Such a section will show the rods separated as smoothly as the fibers in the splitting of straight-grained white pine in those specimens in which they are parallel. In those in which there are moderate curves, the appearance will be similar to that represented in Fig. 10, made from such a section. It will be noticed that in this a number of bundles of rods are broken short off. In enamel with much curvature of the rods such sections present a very rough and gnarled appearance. This form of study is particularly valuable, because the fracture may be first observed with the naked eye, then with the pocket lens, and finally with the medium powers of the microscope, which give sufficient amplification for the observation of the rods. This will give a familiarity with the naked-eye appearances of enamel cleavage of much value in the preparation of enamel margins.

FIG. 10.



Split section of the enamel, showing its cleavage.

To these might be added many other microscopic studies of the enamel, all showing the disposition of fractures to follow the lines of the enamel-rods, tending to force the conclusion that the cementing substance is much less strong than the enamel-rods. The enamel-rods are very hard, so hard that good steel, well tempered, is required to cut them ; but they break readily, and fly like glass. Still, they separate from one another more readily than they break, as is shown by the illustrations and is generally seen in grinding sections.

This cleavage is also easily illustrated macroscopically ; and this point should have careful study, for it is the point of which advantage should be taken for the determination of the course of the enamel-rods about the margins of cavities which we are preparing for filling. I suppose that every dentist does take advantage of it in the opening of cavities ; for when we take a sharp chisel to cut away the overhanging margins of enamel, we soon find that if we apply force in certain directions the enamel chips away easily. By noting the surface of the fracture we may determine the course of the enamel-rods. This I have illustrated at *b*, in Fig. 11. Here the chisel is applied in such a direction that the force used tends, the moment the edge is engaged, to separate the rods in the direction of their length. The direction may be varied from the extreme angle shown in the illustration to a direction parallel with the rods. In this way chip after chip may be thrown off easily, splitting the enamel in the line of its rods until the line *c* is reached, when the inner ends of the rods are supported by the solid dentine. Then it is found that more force is required, and that the enamel will be crumbled or broken across the rods at a quarter or a half their length instead of flaking away through its whole thickness, as before. This is mainly a result of the support given by the dentine ; but a part of it is caused by the fact that the spiral form of the rods by which they are intertwined is more pronounced in that portion of the enamel nearest the dentine. In many specimens the rods are parallel, or nearly so, in the surface half of the thickness of the enamel, and have the spiral form strongly marked in the dentinal half, which renders the cleavage of this portion more difficult. The study of the forms of the surface left by cleavage while operating gives the direction of the enamel-rods in the margins upon which we are operating, and should be taken advantage of in determining the best form of the margin.

FIG. 11.

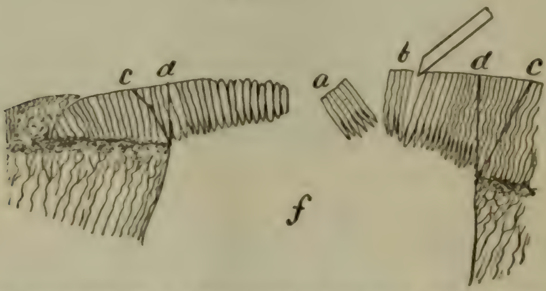


Diagram illustrating cleavage of the enamel and lines upon which the margin should be cut preparatory to filling. *a*, chip thrown off by the chisel ; *b*, position of the chisel in splitting off overhanging margins ; *c*, *c*, correct lines upon which to cut the margins preparatory to filling ; *d*, *d*, incorrect lines for the preparation of the margins for filling ; *f*, cavity in the dentine.

We have now found that the enamel in its entirety is very strong, being composed of hard rods set with their ends to the strain which may be brought upon them, and protected at the margins by being overlapped by the cementum which supports the last, or marginal rods, as a curbstone supports a block pavement. These rods are also united by a cementing substance of fair strength, which is sufficient so long as the enamel is complete. But when a breach has been formed, the strength of this cement is not sufficient to render the enamel equally strong in all directions ; for then it exhibits definite lines of cleavage following lengthwise the enamel-rods, by which group after group of these are easily broken away. We have found also that this cementing substance is more readily dissolved by corrosive agents than the rods themselves, as has been shown by the separation of the enamel-rods by dilute acids ; and also that the action of the corrosive agent or agents which produce caries—the arch-enemy—destroys the enamel by the same method. Thus far I have spoken only of the solid body of the enamel,—its most perfect portions,—leaving its habitual faults, and lines of special weakness due to conjunction of parts in the process of formation, to be considered in another paper. These are therefore points of weakness inherent to the best-formed enamel.

In the management of enamel margins in the filling of carious cavities, how shall we avoid the dangers arising from cleavage? In the first instance, it must be understood that the perfect adaptation of the filling-material to the immediate margin of the cavity is the object to be attained. The best specimen of filling is undoubtedly that in which the filling-material is perfectly adapted to all parts of the cavity's wall,—dentine and enamel. A failure of adaptation to some part of the dentinal walls, or even to the inner portion of the enamel-wall, is not necessarily fatal to the permanence of the filling ; but such a failure at any portion of the immediate enamel margin is fatal to the permanence of the work whenever the tendency to caries remains present in the mouth, or at least in the locality of such failure.

The object sought in making fillings is, first of all, to shut out corrosive agents perfectly; and second, to leave the least possible harbor for débris to undergo fermentation and the formation of corrosive agents to re-attack the enamel about the margins of the filling. If the margin is imperfect, this imperfection forms such a harbor for lodgments. In order to produce perfect margins, we must so form the enamel margins that they shall present the strongest edge possible against which to adapt the filling-material. In forming this strongest edge, consideration must also be had for the strength of the margin of the filling-material, which must not be too much thinned away. If the enamel were equally strong in all directions, and no more friable than the filling-material, a square edge, or such a cut as on the lines *d*, *d*, in Fig. 11, would make, would be good. But on account of the cleavage of the enamel that form would be unsafe. Such a cut is difficult to make and leave a perfect edge, because of the liability to displacement of some of the short ends of rods from the immediate margin. If this should be accomplished, it would be difficult to condense the filling-material against such an edge without displacing some of the short ends of the rods. If, however, the enamel is cut on the lines *c*, *c*, in Fig. 11, or on the lines *i*, *i*, in Fig. 7, the immediate margin will be composed of the ends of rods which have their full length, and with their inner ends resting upon firm dentine. In this we find the strongest form of enamel margin so far as the enamel is concerned; and on most parts of the crowns of the teeth the edge of the filling-material will have good strength and be fairly easy of adaptation.

To so form the enamel margins that they shall have the greatest strength and give the best form for the adaptation of the filling-material, requires an accurate knowledge of the direction of the enamel-rods on all parts of the margins of each cavity. This may be acquired in part by learning the general direction of the enamel-rods on the surfaces of the teeth ; and in part and more specifically by carefully noting the lines of cleavage in opening the individual cavity.

(To be continued.)

CONCERNING THE OXYPHOSPHATE CEMENTS.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

DURING the past year or two many communications have been made on the subject of the phosphate cements. In these the general verdict presented has been very favorable to the cements, and such as to encourage a much more extensive use of them as filling-material than has hitherto been made. The following account of my experience and experiments with these cements is not given with a view to adding anything to that which has already been written in their favor, but rather to serve as a check to any who might possibly be disposed, from the reports which have appeared, to put too much faith in them.

It is usually claimed for the phosphate cements (1) that they may be inserted with great ease ; (2) that they adhere to the walls of the cavity, thereby producing a water-tight filling and doing away with the necessity of undercuts or retaining-points ; (3) that they give support to weak walls ; (4) are poor conductors of heat ; (5) possess an appropriate color ; (6) are cheap ; (7) obtund sensitive dentine, etc.

I am willing to assent in part to all these claims, except to the one which ascribes pre-eminent usefulness to them in obtunding sensitive dentine, regarding which I will speak more in detail farther on.

In point of color they are superior to any filling-material which we possess, with the exception of porcelain and glass, though the absence of the luster and semi-transparency of the enamel places them far from the perfect material in this respect, and renders them decidedly inferior to the two materials just mentioned.

On the whole, I agree perfectly with other writers on this subject, that the oxyphosphate is an exceedingly useful material and that there are many conditions under which it may be used to great advantage. I do not propose to give my views as to when and where it may and should be used; this side of the question has already been so thoroughly illuminated as to make this unnecessary. I propose rather to present a few thoughts on the other side of the question.

My experience with the cements dates from the year 1879, and has been a very extensive one. At first I was very favorably impressed with them, and when, at a meeting of the American Dental Society of Europe, at Cologne, in 1883, Dr. Jenkins and others* condemned the cements, especially for approximal surfaces, "having found them invariably to give way at the neck of the tooth in a few months," I expressed the opinion that this failure was due to imperfect manipulation of the material, imperfect exclusion of moisture, too hasty insertion and polishing, etc. After a more extended experience, however, I was forced to the conclusion that the fault lies, in a great part at least, with the material itself; and that while for a certain class of cavities, for example grinding-surfaces of molars, such fillings, if inserted perfectly dry and with due amount of care, may hold from two to five years and now and then even longer, for those cases where we most need a material of the nature of the cements (extensive cavities on the approximal or buccal surfaces of bicuspids and molars, extending under the gum), they have proved to be failures.

If we with all due caution make an oxyphosphate filling on the approximal surface of a bicuspid, tooth very soft and decayed under the gums, the chances are that at some time, by no means very far off, the patient will return with an aching tooth, and we find a large cavity under the margin of the gums with an exposed and inflamed pulp. This result is brought about not alone by the disintegration of the cement, but secondary caries seems to progress with great rapidity, because the concavity produced by the dissolution of the cement, as well as its roughened surface, serves to retain particles of food which readily undergo fermentation, the filling itself possessing no antiseptic action whatever.

I have not only found this to be the case in my own practice, but have received similar reports from others, and have also had the same experience at the dental clinic of the University of Berlin, so that my faith in the cements as a filling-material for deep-seated caries has been very severely shaken.

The case becomes somewhat different when we protect the neck of the tooth with gutta-percha, as I have been in the habit of doing for the last seven or eight years; we thereby prevent the so speedy occurrence of secondary decay. The result is nevertheless far from satisfactory, for the cement often crumbles away or dissolves at the line of juncture with the gutta-percha; the filling becomes hollowed out toward the neck of the tooth so as to afford a permanent retaining-place for food. Again, where softer grades of gutta-percha or Hill's stopping were used, I frequently found them dissolving out under the margin of the cement, for which reason I always use a very tough preparation of gutta-percha for protecting the neck of the tooth, and Dr. Jenkins recommends the pink variety.

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* *Independent Practitioner*, 1883, p. 603.

Another serious disadvantage of the cement fillings on approximal surfaces is conditioned by the wearing away of the cement. Fillings which have been carefully contoured and "knuckled" will often be sufficiently worn away in a few weeks to permit particles of food being forced between them during mastication; and, since the surface of the cement is always more or less porous and does not admit of the polish of metallic fillings, the particles of food adhere more readily than to the latter, thereby furnishing another cause for the failure of approximal fillings. The forcing of food between the teeth, moreover, usually gives rise to more or less inflammation of the gums.

I agree in part only with those who claim so much for the oxyphosphate in producing water-tight fillings and supporting weak walls. It is true that it appears to possess or, we may say, possesses the property of sticking to dry dentine; it also sticks to dry glass; but we know how readily it lets go when it becomes hard, if the glass is immersed in water. It undoubtedly makes an excellent filling while it lasts, in cavities with strong walls; but if the walls are thin and brittle, as we often find them, for example in badly decayed or pulpless bicuspids, or if the cavity has not been perfectly excavated before filling, then the oxyphosphate has, in my experience, time and again failed to produce a water-tight filling, as well as to support the weak walls. I have repeatedly seen moisture creeping in between phosphate fillings and weak walls. I have also only too often, as a consequence, seen weak walls crumble away from phosphate fillings.

In regard to this point, Jenkins writes as follows: "It seems to me that the adhesive quality of oxyphosphate disappears in time in a very marked degree. Even under gold or amalgam I find it far less reliable, as a support of frail walls, than properly mixed and packed oxychloride. Its early mechanical hardness is a most delusive quality, when, either because of its porosity or its acidulous action upon the walls of the cavity, it soon begins to play the traitor. It is responsible for a deal of suffering and for a lamentable lack of progress in manipulation in many countries and in many practices; of course it has its uses, but it is terribly liable to abuse."

A further quality of the phosphate cements which may possibly materially affect their value is their acid reaction. In mixing the cement no effort is made or has as yet been made to employ the powder and liquid in any definite proportion. Andreae* says that only the orthrophosphoric acid is adapted to the fabrication of cements, since its salts are very constant, and, with few unimportant exceptions, insoluble in water. He calculates from the formula $3ZnO+2H_3PO_4=Zn_3(PO_4)_2+3H_2O$, that the proper proportion in which to mix the cement is 196 parts by weight of the acid and 243 parts of the oxide, pointing out, however, the difficulty of carrying this out in practice.† As a matter of fact the difficulties are much greater than they might appear on first thought, because our different cements do not by any means consist simply of orthrophosphoric acid and oxide of zinc. Their liquid component, as I have been able to ascertain through the kindness of C. Ash & Sons, contains orthrophosphoric acid and metaphosphoric with varying amounts of pyrophosphoric acid. In addition to this, the crystalline form of the acid contains considerable quantities of zinc and lime-salts, the liquid form less, sometimes none at all. In the manufacture of the powder the oxides of zinc, magnesium, calcium, aluminum, etc., are used; there is also said to be present in the powder one-half to one per cent. of silicic acid. Besides, the fluid is subject to considerable variations through the attraction of moisture, while the amount of the powder which we may mix with the fluid again is greatly influenced by the temperature and moisture of the atmosphere at the time of mixing. The coloring-matter added to the powder also interferes more or less with the setting of the cement and with its durability, nor is it immaterial whether the acid is furnished in form of a liquid or of crystals.

We are, consequently, for these various reasons, obliged to incorporate enough of the powder into the liquid to obtain a paste of "the proper consistency" without any regard to the chemical aspect of the question. Whether we add more or less of the powder than is demanded by the formula, I am unable to say. I have noticed, however, that the paste invariably has a decidedly acid reaction, due to the presence of free acid (or acid salts?). Not only is this true of the freshly mixed paste, but if we moisten a piece of cement which has already become perfectly hard, we shall find that it readily gives up acid. Break up a ball of cement as large as a pea into small pieces, put them into a test-tube, and cover them with two or three drops of water; test this with blue litmus paper, and it will be found to have a more or less pronounced acid reaction. Furthermore, thin pieces of dentine dropped into it will show signs of decalcification in four to six days. This action varies exceedingly with different preparations of the phosphate cements. The question now arises whether this capacity of the phosphate cements to impart an acid reaction to surrounding media may not have a slight decalcifying effect upon the walls of the cavity when they are permeated with moisture.

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* *Zahnärztl. Wochenblatt.*, 1889, No. 11.

† I was very much surprised in mixing two different brands of phosphate cement in the proportions demanded by the above formula to find that it turned out very much thinner than we ever use it in practice, by which the thought may be suggested that we usually mix the cements too thick.

It is particularly at the neck of the tooth, where the dentine is often not perfectly intact, more or less porous, and filled with moisture, that possibly enough acid might be imparted to it to bring about an infinitesimal decalcification at the margin of the cavity. The following experiments appear rather to confirm this idea.

A number of shallow holes were bored in a piece of ivory and filled partly with oxyphosphate, partly with gutta-percha. The piece was then inverted and placed upon a strip of moist bibulous paper on the bottom of a shallow glass vessel, which was well covered so that evaporation could not take place. After a few days the fillings were removed, the holes washed out, and the piece stained with fuchsine. I found that the walls of the cavities which had been filled with cement became more deeply stained than those of the other cavities, indicating that a slight decalcification had occurred.

In a second experiment I bored a shallow hole in a piece of moist bone and put a minute quantity of lactic acid into it, in order to produce a very thin layer of decalcified dentine on the bottom of the cavity. After a quarter of an hour I washed out the cavity, neutralized it exactly, filled it with phosphate cement, and rolled it up in wet bibulous paper, where it was left for twelve hours. At the end of this time, the filling being removed, the slightly softened dentine on the bottom of the cavity was found to have a clearly acid reaction ; that is, it had taken up a certain amount of acid from the filling. I do not, however, wish to give the impression that I attach too much importance to these facts. They may have a certain bearing, as stated above, upon the durability of cement fillings in approximal or buccal cavities, and suggest the idea that the manufacturer of cements should seek to produce compounds which possess the quality under discussion in a minimal degree. The cements now in use vary greatly in this respect, some showing but a very slight, others an intense acid reaction. One preparation recently tested showed no acid reaction after twenty-four hours. Of course the acidity of the material will depend to a great extent upon the manner in which it is mixed ; the thinner it is mixed, the more free acid (or the more acid salts) it will contain.

The prevalent idea that phosphate cements have an obtunding action upon sensitive dentine is entirely at variance with the observations I have made. I have noticed time and again that in boring out old phosphate fillings, very pronounced symptoms of pain are manifested by the patient the instant the bur passes through the cement and comes in contact with the dentine. Others have also noted this fact, and Erzberger* even speaks of the hypersensitiveness of the dentine produced by phosphate fillings.

In accordance with my experience, phosphate cement is the last thing that I should ever think of using for obtunding sensitive dentine.

I should say, however, that my experience with phosphate cement as an obtunder extends only to fillings which have been in the mouth for some weeks or months. It might be suggested by those who claim obtunding properties for this cement, that the sensitiveness is diminished only for a certain time, to reappear again after a few days or weeks. Granting that such is the case, I should never think of using phosphate cement for the mere purpose of obtunding sensitive dentine, since the same end may be accomplished much more easily by other means.

A pledget of cotton, well saturated with pure carbolic acid, sealed into the cavity with Fletcher's artificial dentine (which, by the way, is incomparably superior to either wax, gutta-percha, or phosphate for inclosing applications), and left for two to four days, will usually have a magical effect in obtunding sensitive dentine. The application may be made in a minute and removed in five seconds, while the removal of a phosphate filling is often anything but a pleasant task for both patient and operator. For this reason, also, I would never use phosphate in cavities very difficult of access, particularly at the cervical wall, even for temporary purposes.

Another feature of the phosphate cements to which I would like to call attention is their deleterious action upon the pulp. I referred to this in the *Zahnärztliches Wochenblatt.*, 1888, No. 44, though I believe others had called attention to it still earlier. It seemed to me then, however, that the disastrous results following the use of the oxyphosphates, sometimes many months after the insertion of the filling, were to be accounted for by the fact that the cements were used chiefly in doubtful cases, where probably any other filling-material would have brought about the same results.

After more experience, I am ready to believe that such is not the case, but that many preparations, at least, of the phosphate cements, even in cases where the pulp is perfectly intact, induce, in the course of time, a diseased condition. I will give here one case out of many that have been brought to my notice which certainly seems to support this view. Master N., aged twelve years, presented himself to his dentist with the superior incisors all decayed on the approximal surfaces. None of the cavities, however, reached to the pulp, nor had the boy complained of any pain whatever. The teeth being soft, were filled with phosphate cement. A little more than a year later the pulps in all the four teeth were dead. I suppose that every dentist practicing in a place where the phosphate cements are much used will have had many of those troublesome cases, of which the following that occurred in my practice this morning may be regarded as a typical form: Mrs. N., aged thirty-five, complained of pain "over the whole of the lower jaw," extending up the ramus and thence to the upper jaw; in fact, there was more or less soreness in the whole left side of the face. The pain during the day, dull in character, often became acute on going to bed at night, or in passing from the street into a warm room. No complaint of pain from either moderately hot or cold water. The patient was not able to point out the tooth, but the examination showed at once a lower first molar with a large cement filling, somewhat defective at the neck, as usual. Tooth not markedly sensitive to percussion. The pain, which was first noticed about three weeks ago, had grown gradually more aggravating up to the present time. The filling was removed, the patient evincing pain whenever the bur came in contact with the dentine. The pulp was found covered with a layer of dentine scarcely thicker than tissue-paper, the removal of which permitted the escape of a drop of pus about as large as the head of a pin, followed by dark bluish-red blood. If the filling had been removed a week or ten days ago, we should have found an inflamed pulp, but probably no pus. If it had not been removed at all, the symptoms would gradually have increased, finally culminating in an acute total inflammation of the pulp. In other cases, however, I have observed the pulp to die under a phosphate filling without giving rise to any pronounced subjective symptoms, until pericementitis supervened.

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* *Correspondenz-Blatt für Zahnärzte*, 1889, p. 101.

Although I am not prepared to say that I consider the deleterious action of the phosphate cements upon the pulp as established beyond all doubt, yet the probabilities that they do have such an action are so great that corresponding precautions are certainly in place. I accordingly never fill a cavity, except it be very shallow, with phosphate cement, without having first covered the bottom of it with gutta-percha, or some other material which serves the same purpose. Palmer,* Morgan,† and others unhesitatingly attribute to the phosphates the property of devitalizing the pulp. Finally, I fail to see what advantages the phosphates can have as filling-material for root-canals; their sticky nature renders them much more difficult to introduce than the oxychlorides, particularly in cases of narrow canals, and they are also decidedly inferior to the latter in antiseptic action.

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* *International Dental Journal*, 1889, p. 389.

† DENTAL COSMOS, 1889, p. 799.

Of those communications which speak more favorably of the cements than I have been able to I mention "Die relativen Vorzüge des Goldes und Cementes als Füllungsmaterialien," von C. W. Dunn, *Correspondenz-Blatt für Zahnärzte*, 1887, S. 52; "Oxyphosphate of Zinc," by E. S. Gaylord, *Archives of Dentistry*, January, 1889; "Deciduous Teeth filled with Oxyphosphate," by J. A. Robinson, *Archives of Dentistry*, January, 1889; "The Place of Cements in Dental Therapeutics," by A. H. Thompson, *Western Dental Journal*, 1890, No. 9. F. M. Harris, "Cements in Molar Teeth," *Dental Review*, January, 1889, has not been so well satisfied with them, still less Erzberger, *Correspondenz-Blatt für Zahnärzte*, 1889, S. 101.

In conclusion, I do not wish to give the impression that I never make use of the oxyphosphates in practice. I often meet with cases where I consider them better than any other filling-material which might be used; I sometimes use them also where I have the feeling that some other material would be better, only because of the ease with which they may be inserted, both for patient and operator. On the whole, however, I use them much less than formerly, and I am inclined to believe that our efforts should rather be directed to restricting than to extending their use, because the temptation to use them is so great that there is always more or less danger, as Jenkins has well said, of abusing them.

NOTE.—*Combination of Cement with Amalgam.*—A method of combining cement and amalgam has been recently used to some extent in Germany, and, since the combination according to present reports appears to possess some very considerable advantages over cement alone, a few words concerning it may not be out of place. I am not able to say who first made use of these two materials in the manner to be described. Dr. Sachs, of Breslau, has done much to bring the method to the notice of the profession.

We mix the amalgam in the usual manner, avoiding an excess of mercury, whereas the cement is mixed perhaps slightly thinner than usual; the two are then thoroughly incorporated by means of a stiff spatula. The amount of amalgam used is, in bulk, about one-third to one-half that of the cement. The material may also be prepared by simply dropping the amalgam already mixed into the liquid of the phosphate cement and then incorporating enough powder to make a stiff paste. The filling is inserted in the same manner as a simple cement filling.

The experience with this combination has not yet been sufficiently extensive to admit of forming a definite opinion as to its value. It is claimed for it that it possesses adhesive properties equal to or nearly equal to those of the phosphate cement alone, that it is sufficiently hard to resist the action of mastication (of this there can be no doubt), and, which is of greatest importance, that it is not altered by the action of the oral fluids to any appreciable extent.

It is well worth a trial.

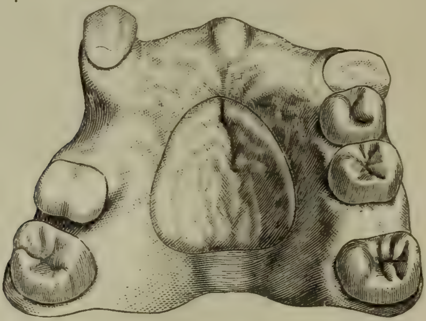
I have found it in two cases particularly serviceable in setting pivot-teeth with very short pivots, where cement alone had utterly failed.

REGULATION SUPPLEMENTED BY BRIDGE-WORK.

BY R. WALTER STARR, D.D.S., PHILADELPHIA, PA.

A LADY patient, of about twenty-four years, presented a case of a perplexing kind, which Fig. 1 makes sufficiently apparent.

FIG. 1.



A suction chambered plate had long been worn, but the excessive projection of the superior cuspids had made impossible a conforming arrangement of artificial incisors by the first or any subsequent prostheticist. Preliminary regulation was finally decided upon, and a strong rubber ring was stretched to embrace the divergent cuspid and second bicuspid of the right side. The interaction of these upon each other soon brought them upright, and then a vulcanite vault plate was made with sheet metal clasps to include the molars, bicuspids, and right cuspid. A pulling jack-screw was then by a collar attached to the left cuspid and to a pin in the plate near the right cuspid, and the result is shown in Fig. 2.

Both cuspid crowns were then removed by first cutting around them with a small diamond disk a groove at about a sixteenth of an inch from the gum, and then with the excising forceps quickly cutting off the crowns. The pulps were painlessly removed by the driven wood point process, and the apical portions of the canals immediately filled with gutta-percha.

A retaining fixture was made of gold wire to which were soldered posts fitting the cuspid canals, and cap-crowns fitting the right bicuspid and left molar. A plate brace was soldered to the bicuspid cap and rested against the molar. Fig. 3 shows the retainer in place, and it was worn without removal for three weeks, by which time the regulated teeth had become firm and all soreness had passed away. A bridge denture was then made in the usual form, employing as piers the gold cap-crowned right molar, second bicuspid, left first and second bicuspids, and porcelain-faced caps with posts in the two cuspids.

FIG. 2.

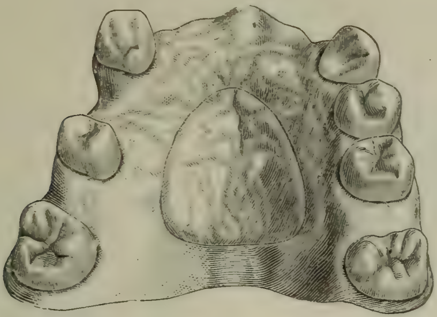
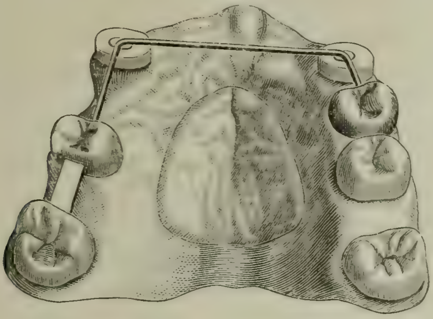


FIG. 3.



The bridge has been comfortably and usefully worn for eighteen months, and the resultant restoration of facial comeliness has completely satisfied both the patient and the operator.

In the construction of contiguous single porcelain-faced crowns, as for instance the superior incisors and cuspids, it is sometimes desirable to solder the series in position on the cast, and this cannot commonly be done without risk of soldering together the adjacent backings. I avoid such risk by interposing in the investment of plaster and asbestos little strips of very thin mica. Fig. 4 shows the six teeth and caps (the posts are imbedded, and so not seen), and backings with the intervening mica partitions. It is obvious that the solder cannot pass those barriers, and a great incidental advantage is found in the fact that the mica walls serve as matrices for contouring the backings with solder to any desired thickness or taper. When the piece has become cool, the investment is readily broken away, and the teeth all found distinct and in proper relative positions for finishing and mounting. It also saves much time and trouble to have but one piece to invest and heat up instead of six separate crowns.

FIG. 4.

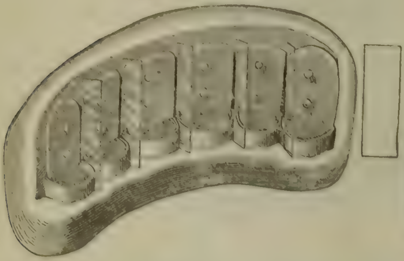
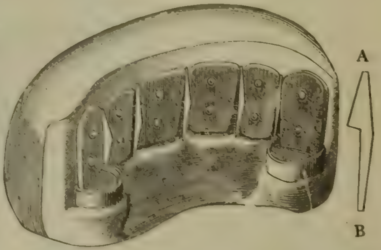
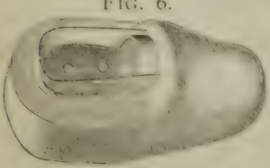


FIG. 5.



I have furthermore utilized my partition principle with reverse results, as follows. In uniting the backings of a long bridge on which it is desired to thicken the backings with a mass of solder, this is liable to follow the blow-pipe flame from one backing to another, so I interpose in the investment little partitions of thin platinum such as are shown separately and in the investment in Fig. 5. The tail-part, B, is imbedded in the plaster and asbestos, and holds the partition in place. The width and taper of the head part, A, limits the thickness of solder on the backing, which may thus be made as thin or thick as required, and at the same time the solder is prevented from flowing past the partition as the piece is turned from side to side under the soldering flame. After removal from the investment, the partition tails can be readily cut away in finishing, which is less laborious and wasteful than usual, because the partitions have favored the massing of the solder precisely where and to the thickness wanted.

FIG. 6.



When it is desirable to thicken or build the backing of a single crown, a ribbon of mica is bent round it, made fast with hard wax, and invested as shown in Fig. 6. A ribbon of mica may also be wrapped around the collar of a cap-crown and be secured by twisted binding-wire ; pieces of gold plate or solder can then be melted on the cap in the matrix, to be subsequently carved into cusps of any desired thickness.

The mica matrix is furthermore useful in operative dentistry, for the reception of any of the plastic filling-materials ; and for these purposes its nature, pliability, and extreme thinness admirably adapt it.

NOVEL DENTAL BRIDGE-WORK.

BY C. L. ALEXANDER, D.D.S., CHARLOTTE, N. C.

MODERN dental bridge-work, showing in its various forms scientific accomplishments and a high degree of skill on the part of some of its constructors, bids fair to become a permanent factor in dentistry, and renders probable the most sanguine anticipations of its early advocates.

My own experience in practice along the lines of work described and illustrated by recent writers on the subject leads me to the belief that the process which will now be briefly described is in some important respects a new and useful improvement.

FIG. 1.

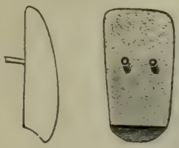


FIG. 2.

FIG. 3.

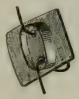
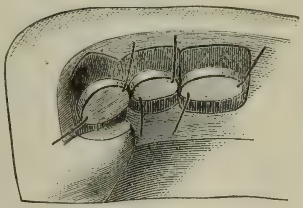
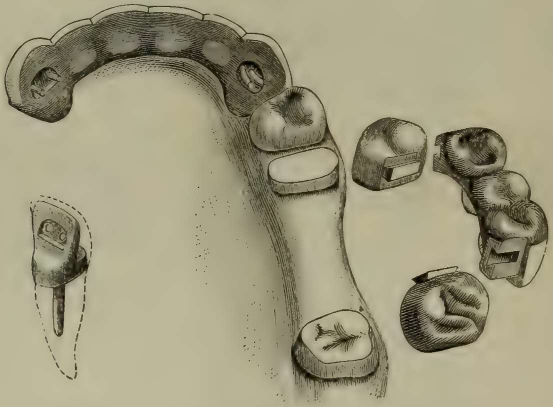


FIG. 4.



The common method of subjecting the porcelain faces to the heat and subsequent cooling attending the process of soldering the backings and caps results frequently, in inexperienced hands, in checks or fractures of the porcelain. I avoid such risk by the use of teeth or facings having long pins, as in Fig. 1. The facings are fitted to the gold or platinum backings as usual, then articulated and adjusted with relation to their anchorages, and suitably cemented in position with hard wax. The facings are slightly heated with a hot instrument to soften the wax around the pins, then carefully removed without disturbing the backings ; half-inch pieces of fine iron binding-wire are bent to form staples, their ends heated and pushed through the pin-holes in the backings, leaving projecting loops of wire which serve as an anchorage to the backings when invested. The case is then invested in plaster and marble-dust. From a strip of very thin pure gold or platinum three thirty-seconds of an inch wide (Fig. 2) small oval ferrules are formed. The hard wax is then removed from the backings, and the little ferrules set on them to surround the pin-holes (see Fig. 3), and are fixed in place with hard wax applied on the outside of the ferrules. These are then neatly filled with plaster and marble-dust, and when this has hardened the wire ends are bent close over the edges of the ferrules to prevent their displacement in the removal of the wax and in the process of soldering. Fig. 4 shows the invested piece ready for the soldering, which will unite the ferrules to the backings and at the same time join the backings to each other and round up the piece to the required fullness in the completion of the bridge-backing. The skeleton bridge can then be tried in the mouth, and if any corrections for fitting are required they can readily be made by bending it, or by sawing the piece apart and resoldering. After rough-finishing the piece, the facings are then put in place with a very little thin oxyphosphate cement between the teeth and the backings, and the pin-ends are bent down on the backings within the little ferrule chambers. These are then packed with amalgam, mixed as dry as will afford complete amalgamation, and pressed firmly into the chambers and around the pins. So soon as the amalgam has become hard enough to file without choking the file, the piece is to be finished and mounted as usual. Fig. 5 exhibits such a finished piece, the cuspid chambers being left unfilled to show the unbent and the bent-down pins within the chambers. In the same figure is shown the skeleton of a left central crown ready to receive its porcelain facing.

FIG. 5.

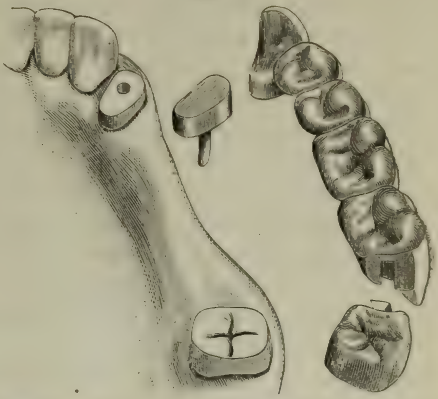


This work can be readily repaired in the mouth by cutting out the amalgam from the chamber and securing the new facing as previously described. A notable advantage of the method is the avoidance of gold-tipped oral teeth. Of course the bridge may be permanently secured to its supports by cement as usual.

Fig. 5 shows also an outwardly removable bridge, the dovetailed sockets of which admit of wedge-tight insertion in a horizontal plane, and the denture is therefore not liable to be displaced by the lifting action of food during mastication.

Fig. 6 shows a removable bridge adaptable to inclined teeth, which may be capped and carry tapering dovetailed sockets like that of the molar in the illustration.

FIG. 6.



The new mode of bridge-construction and these examples of removable bridge-work are respectfully submitted for the consideration and optional adoption of the profession in the belief that they will prove to be of practical value, the first-named having been clinically demonstrated at the July meeting of the Southern Dental Association at Atlanta.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, November 11, 1890, in the new building of the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. M. C. Gottschaldt, chairman of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic of the society was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, Broadway and Ninth street. The number in attendance was seventy-four. Dr. S. C. G. Watkins, of Montclair, N. J., filled a lower molar crown cavity with soft and cohesive gold foil, using glass instruments to condense the gold. The advantages claimed for them over steel and ivory are their smoothness, the non-adherence of gold to the instruments, that they are easily and cheaply made, and that but little pressure is required to burnish gold against the cavity walls,—a fact greatly appreciated by a delicate patient or one having a tender tooth. Dr. Watkins also exhibited a set of double-end amalgam instruments, well adapted by their shapes to almost any case. . . . Dr. E. D. Frost, of New Jersey, filled two approximal cavities in central and lateral incisors with Rowan's No. 4 extra soft gold foil, and finished with No. 30 rolled gold ; also filled a cavity in a second lower molar with soft foil, and finished with Nos. 30, 60, and 120 rolled gold. The Bonwill mechanical mallet was used, and the time occupied for filling the three cavities was forty-five minutes. The heavy foils were used for finishing, in order that a hard surface free from pitting might be made. . . . Dr. F. J. McLaren, of New York City, exhibited a small furnace for making porcelain work, such as inlays, blocks, crown- and bridge-work, etc. The furnace is not more than four inches long by about three inches in breadth. It has a platinum muffle, and the foot-power blow-pipe is used in connection with it ; it heats up quickly, and bakes in from four to five minutes ; it cools rapidly, and without checking the piece which is baked. . . . Dr. E. P. Brown, of New York City, exhibited three new appliances : one, a glass dish holding a brush, used for cleaning disks, burs, instruments, etc., by simply thrusting into it the revolving bur or disk. The second appliance is the "handy box," which holds different kinds of polishing strips in such a manner that the grade desired may be selected in a moment without disturbing the rest. A handy box for disks was also exhibited. . . . Dr. H. G. Marshall, of New York City, presented casts of the mouth of a young man, aged twenty, in which the right superior central is just making its appearance directly above the right lateral. The question asked was, which tooth to remove, the central or lateral ? The new tooth having made considerable progress in a few weeks, and the lateral not quite filling the space, the advice given was to extract the lateral and assist the central to its place. . . . Mr. Charles Marchand, of New York, exhibited and explained the use of his medicinal peroxide of hydrogen. Samples were distributed, and also pamphlets treating of the preparation, its storing and using. . . . Dr. Hunter showed an obtundent for which he claims universal success. It was tried in a cavity near the gum in a wisdom-tooth, and at the expiration of seven minutes pain was still present when the tooth was touched ; another attempt was made in nine minutes, and again in twelve minutes the sensitiveness had not diminished. . . . Dr. J. A. Kimball presented for advice a young man of twenty-three with a considerable enlargement of the submaxillary gland. About six weeks previous the abscessed posterior root of the second lower molar was extracted. There was a copious discharge of pus at the time, and this continued for three weeks subsequently, when the patient returned for treatment. The socket was injected with phenol sodique, and the next day when the patient presented himself the gland had become much distended, interfering somewhat with speech and deglutition. By the application of pressure the salivary secretion could be forced out, and the swelling was attended with little pain. Iodine was applied externally beneath the maxilla, and chlorate of potash in saturated solution recommended as a mouth-wash. Aromatic solution of sulphuric acid was forced into the socket of the extracted root to act upon the ragged surface of necrosed bone. Under this treatment the discharge of pus ceased, but the gland remained swollen. At the clinic, after several of those who were present had expressed opinions, Dr. Atkinson diagnosed the case as ranula, and at the request of the parties interested proceeded to operate. Making an incision with a bistoury near the duct of Wharton, he penetrated a thick layer of congested tissue and procured a free discharge of inspissated pus mingled with blood. The sac was then syringed with Marchand's peroxide of hydrogen, followed by the insertion of a tent of cotton saturated with a mixture of creasote and oil of cloves in equal parts. This is to be left in for a day, when the sac is again to be cleansed with peroxide. The interior of the sac is then to be rendered as dry as possible and pyoktanin in powder introduced by means of being wrapped in bibulous paper and forced through the opening made by the lancet. This treatment is to be repeated daily until healthy granulation replaces the present septic condition. Dr. Atkinson predicts that one or two dressings will accomplish a cure. If the discharge from the root-socket is resumed, he recommends anesthetizing the parts with some compound of cocaine, Dr. Hunter's obtundent for instance, opening down to the alveolar process and removing with a bur the rough or necrosed portion of bone.

INCIDENTS OF OFFICE PRACTICE.

Dr. Theodore A. Wadsworth described a vulcanite and piano-wire regulator.

A case of protrusion of the upper teeth was regulated in the following manner.

The patient, eighteen years of age, strong and robust, was a young man, whose upper teeth projected beyond the lower ones nearly half an inch. The projecting teeth were only partially covered by the upper lip, and gave the patient a very unpleasant expression.

The superior dental arch was considerably V-shaped, otherwise both arches were well formed. The teeth were large and of good material. The vault was high and pointed.

Thumb-sucking seemed strongly indicated as the probable cause of this deformity, the patient having been addicted to that habit past the period of childhood. As far as could be learned from the parents, there was no abnormal hereditary transmission.

Fig. 1 shows the relation between the upper and lower teeth at the time of presentation for treatment.

The method adopted for correcting this deformity was that which has been described and recommended by Dr. V. H. Jackson, and published in the proceedings of this society in the DENTAL COSMOS, vol. xxx, page 510.

To gain sufficient space to allow the front teeth to be moved backward, the superior first bicuspids were removed. A vulcanite plate was fitted to the roof of the mouth, and well cut away from the lingual surfaces of the front teeth. Piano-wire springs of No. 21 wire were vulcanized into the plate, passing through the spaces made by the removal of the teeth, and following around from each side of the labial surfaces of the cuspids and incisors were made to pass each other at the median line. These springs were bent to give the required pressure on the teeth to be moved, and the pressure controlled by bending the springs from time to time as the teeth were moved inward. The appliance was held in position by clasps made of No. 20 piano-wire fitting the bicuspids and molars (Fig. 2). It was inserted December 7, 1889, and the deformity corrected as shown by Fig. 3, March 20, 1890. It was worn continuously, and could easily be removed for cleansing and replaced by the patient, and caused no pain or inconvenience whatever. The patient was seen once or twice a week to change the pressure as required.

FIG. 1.

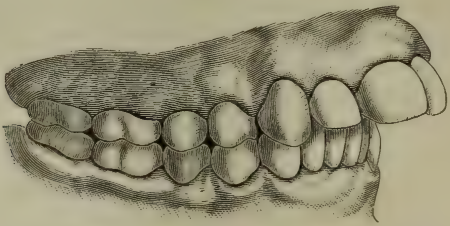
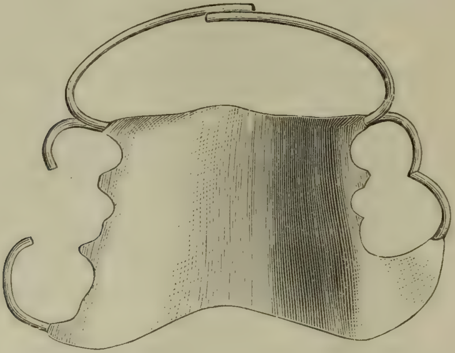


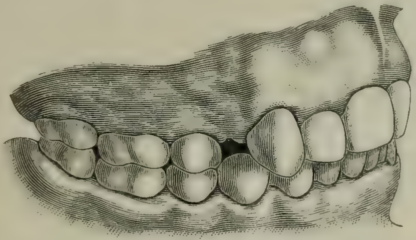
FIG. 2.



For retaining the teeth in position an appliance was made by fitting gold collars around the second bicuspids, to which was soldered a narrow half-round gold wire, extending around the labial surfaces of the front teeth. The collars were cemented to the bicuspids with oxyphosphate. Also there was soldered to the labial surface of each gold collar a platino-iridium wire extending backward and clasping the molars adjoining, for the purpose of resisting any tendency that might exist in the newly regulated teeth to move outward, carrying with them the bicuspids to which the retaining appliance was attached.

The entire six front teeth were moved at one time. Also the V-shaped arch was rounded and brought to a proper shape, and the spaces made by the extraction of the teeth nearly closed.

FIG. 3.



The appliance was of the most simple character, quickly and easily constructed, and requiring but little attention as the case progressed.

If the more complicated appliances, such as heretofore have generally been used in correcting deformities of this kind, can be done away with, and a more simple fixture substituted which will be less conspicuous in appearance, more comfortable to the patient, requiring less time and attention on the part of the dentist, as well as bringing about a more favorable result in a shorter space of time, it is certainly a most desirable advance, and one to be highly appreciated by both patient and dentist.

Dr. Watkins. Mr. President, about two or three months ago a gentleman from Boston, by the name of Young, gave a clinic down at White's, in which he injected the preparation "Dorsenia" for the purpose of extracting without pain. Some who saw that operation claim that the patient did experience pain. I saw the same man operate in Boston the week before last; he had a boy fifteen or sixteen years of age with the four upper incisors so badly decayed that they were broken off almost to the gum. He inserted a hypodermic needle and injected some of this preparation. At the first puncture of the needle the boy felt some pain. Injections were made in different places, both lingually and labially around these roots, until he had injected it about eleven times altogether,—as long as the gums would hold the material, the operator said. Dr. Young then extracted the teeth, and the boy said that he did not experience a particle of pain after the first injection.

The president introduced Dr. Wendell C. Phillips, of New York, who prefaced the reading of his paper by saying,—

Mr. President and gentlemen, before beginning my paper I wish to express my pleasure in having been invited to address a representative class of men, as I believe you to be.

TRANSLUMINATION OF THE ANTRUM OF HIGHMORE, NASAL CAVITIES, FRONTAL SINUSES, AND LARYNX, WITH REMARKS ON THE TREATMENT OF EMPYEMA OF THE ANTRUM.

A healthy interchange of thought between two professions so near akin as ours must result in profit and instruction to both, besides acting as a stimulus for greater and more painstaking scientific research. No doubt each profession would be greatly benefited and do better work if we could oftener meet on occasions like the present, and carry home with us ideas that may be tested in the every-day work-shop of experience and eventually be utilized for practical purposes.

The labors of the surgeon dentist and the rhinologist often bring them on to common ground. The antrum of Highmore is a region where we meet; not like the opposing forces of two armies arrayed for battle *against* each other, but to join forces and rout the common enemy. The remarks in this paper will bear chiefly upon the diagnosis of empyema of the antrum by means of the method now known as translumination, with a short description of translumination of the other cavities mentioned in the title.

No department of science is progressing with more gigantic strides than the science of electricity, and while the master-minds go on opening up new channels of usefulness for this agent, the development of the medical and surgical features is keeping well apace.

Voltolini crowned the efforts of a useful life by developing and bringing to the profession still another practical use for electricity. He gave it the name "Durchleuchtung," the best translation of which is probably that given by Freudenthal,* who used the name translumination in his valuable paper giving the first description of the method in this country. He has also modified the apparatus to some extent, especially the lamp used for illuminating the larynx, and which will be used for the demonstration this evening.

For transluminating the antrum, nasal navities, and the frontal sinuses an absolutely dark room is required, but the larynx may be explored in a moderately dark room. The apparatus used consists of a Heryng's transluminator for the antrum and nasal region, which is a mounted lamp on an attachment similar to a tongue-depressor. The lamp is four-candle power; with this comes an attachment for transluminating the frontal sinuses. However, a better instrument for translumination of the frontal sinuses will be described in another part of this paper.

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* *Med. Record*, May 17, 1890.

For the larynx Voltolini's transluminator, modified by Freudenthal, is used. This is also a four-candle power lamp, inclosed in a cylinder, anterior to which is a water-bulb, which serves both as a lens and as a means of preventing overheating. The current for these lamps is supplied by four of Gibson's portable storage-battery cells, of two volts each, and a capacity of fifteen ampère hours. The apparatus is supplied by the W. F. Ford Surgical Instrument Company.

The light cannot be held in the mouth for a great length of time without burning the patient; consequently in a demonstration there must be intervals allowed for cooling the apparatus. A great boon will have been bestowed upon our profession when a form of electricity shall have been discovered that will give a maximum of light with a minimum of heat. In the Smithsonian Institution in Washington there is an instrument constructed for measuring the quantity of heat given out by light-producing objects, and so delicate is it that it will record the degree of heat given out by a fire-fly. Now it would seem that with instruments so delicate to work with, a feature of electricity might be worked out that would give the light and withhold the heat. When the light is introduced into the mouth, the face becomes lighted up to a degree that gives it the appearance of an old-time jack-o'-lantern. The rays of light pass through both walls of the antrum so that it can be readily seen externally. Of course the degree of light seen will vary with different subjects, according to the density of the osseous structures. Young subjects are better than old, and of these girls are better than boys. The reasons for this are obvious.

Occasionally, in old subjects, there is very little illumination for the reason above named. Now, should there be pus or any solid tumor in the antrum on either side, it stands to reason there would be no light on the corresponding side when translumination is resorted to. This is the case, and by the development of this principle we have been furnished with the most reliable means for making an early diagnosis of empyema of the antrum yet known. Its very simplicity gives it a practical aspect.

All that is required is to have the electrical appliances and a dark room, when a diagnosis may be easily made. It is also painless, and does away with the necessity for exploratory drilling or for tooth-extraction in a suspected case. Another great advantage is that by means of translumination a much earlier diagnosis may be made than formerly, when a positive diagnosis could only be made after the symptoms had assumed a most severe type. It will also greatly reassure the patient to be told that we have at our command a sure means of diagnosis, and that no operative procedures will be resorted to until a positive diagnosis has been reached.

The anatomical surroundings of this cavity are such that a diagnosis of its diseases is extremely difficult, and we hail with delight any aid that may assist us in this direction.

There are cases where very little light will come through the walls of the antrum when in a healthy condition. In such cases, when we have reason to suspect antral disease, we have only to examine the nasal cavity on the affected side, and no illumination will be found, whereas when no antral disease is present we get a bright illumination of both anterior nares when the lamp is held in the mouth. This seems to be explained on the theory that the rays are reflected from the antrum to the nasal cavities. This point strengthens the diagnosis very much, and is hardly less important than the translumination of the antrum itself. Therefore, in a given case, if by translumination we get no reflection of light through the walls of the antrum, and an examination of the adjacent nasal cavity reveals no reflection of light, we may be convinced of the presence of something in the antrum that is impermeable to the rays of light. As a rule, this something is pus, but it may be one of the various solid or semi-solid tumors that are occasionally found in this cavity. In either case we have the attending symptoms to help us to determine to which class the case belongs. In cases where the effusion is serum, you will find the light shining on the affected side.

Quite a number of cases have been reported where, by this method, a positive diagnosis of empyema of the antrum has been made and subsequently confirmed by operation. Heryng* reports ten cases. Vohsen† reports satisfactory results without giving any special number of cases. Freudenthal‡ reports three cases, and says of them, "In all three the non-appearance of light in the affected side could easily be noticed. I operated on them, and found great masses of pus in all."

Trial of this method gives the operator satisfaction, therefore, first, because to one patient he can say positively, You have pus in the antrum, and to another an equally positive assertion may be made that he has no pus in the antrum. Translumination of the nasal cavities is accomplished by the same method that is used for the antrum, viz: by introducing the lamp into the mouth, and when so introduced we find, by using the speculum, that the nasal cavities are well lighted, and the various anatomical elements brought into view. The color of the tissues is very different from that seen when an ordinary reflector is employed, being a very dark blood-red, and varying only at those points where the rays are stronger on account of passing through thinner bone. Attempts have been made to use a light behind the velum, but it usually fails on account of the intolerance of the lamp in that position.

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* *Berliner klinische Wochenschrift*, 1889, p. 774.

† *Ibid.*, 1890, p. 274.

‡ *Med. Record*, May 17, 1890.

Before leaving the descriptive portion of this paper, I desire to call your attention to some other applications of translumination that will no doubt interest you.

For translumination of the larynx a lamp has been devised that is applied to the external surface at the pomum Adami or near the cricoid cartilage. This is held in place by the patient or an assistant. The room need not be very much darkened. With this lamp in place, the tongue is withdrawn and a laryngeal mirror is used exactly as in ordinary examinations, minus the head-mirror. Here we also get the continuous blood-red color, which fact somewhat militates against its usefulness as a means of diagnosis, on account of being unable to distinguish the ordinary inflammatory conditions. But it is of vast assistance in making out laryngeal growths and determining their size and density.

The frontal sinuses are easily illuminated by a simple device. A small one-candle power lamp is used, over which is drawn a section of rubber tubing which is allowed to project about half an inch beyond the lamp. The free end of the tubing is placed as far as possible under the orbital plate of the frontal bone near the inner canthus of the eye. The eye should be kept closed during the proceeding. The light placed in the position described will illuminate the entire frontal sinus. This requires an absolutely dark room. It might be mentioned here that in favorable cases the antrum may also be illuminated by placing this lamp externally underneath the cavity.

At the close of this paper I will endeavor to demonstrate all of these forms of translumination on patients brought here for that purpose.

The diagnosis of empyema of the antrum, like all surgical diseases, is of great importance, and many times it is of greater importance than either etiology or treatment, because more difficult to determine. But after the diagnosis has been made by one or more of the various methods, a careful investigation should be made in order to establish the etiology of the disease in the case at hand, because the plan of treatment will depend largely upon the cause.

Now, it is perfectly natural that the dentist should approach this cavity from his stand-point,—viz, the teeth and alveolar process,—

because this class of cases oftener present themselves to him for treatment, and it is equally natural to suppose that the rhinologist should search for the cause in the domain where his skill is greatest. Both may be, at times, in error, and a fair interchange of ideas and experience will not be amiss at this time.

A careful review of dental literature has led the writer to the conclusion that your profession believe the almost universal origin of this disease to be diseased teeth. This in a very large proportion of cases is no doubt true, but an opinion may be ventured that in some cases the diseased teeth are a result rather than a cause of antral disease. The pent-up pus must escape, and what could be more natural than for it to burrow downward through the antral membrane at the weak points where the tooth-roots enter it or are very near it,—set up an active external inflammation that would result in a carious condition of the adjacent teeth and alveolus? If this does occur, it is quite necessarily attended by a stenosis of the ostium maxillare due to a hypertrophic rhinitis.

The views of Garretson* and of others who have written books on oral and dental surgery, while based on large experience, seem to be influenced by the fact that, as a rule, only those cases of antral disease that are attended by carious teeth seek the dentist, while those due to other causes fall into other hands. The views of Bosworth,† Zuckerkandl,‡ Krause,§ and others seem to hold good, viz: that the disease in a great many cases is due to a hypertrophic rhinitis which results in an occlusion or a stenosis of the ostium maxillare. This stenosis becomes an exciting cause of a catarrhal inflammation, which in turn assumes a purulent type. Nasal polypi, arising, as they do, so near the ostium maxillare, may produce stenosis. The treatment must be governed by the cause. If hypertrophic rhinitis, or nasal polypi, be the cause, and the disease is not advanced, the rational plan of treatment would be to reduce the hypertrophy and thus open the natural avenue of escape and re-establish the normal function of the part. If a carious tooth is the starting-point, no better treatment can be resorted to than the removal of the tooth,—a process that will bring about both the removal of the exciting cause and open up a channel for the escape of pus. In the light of modern research and with the modern appliances for opening this cavity in any of its dependent portions, there can be no excuse for him who would enter the antrum by extracting a tooth not known to be unsound. The case related by Garretson,* where no pus followed the extraction of a tooth afterward found to have clean roots, and where a probe passed up through the alveolus was forced through a resisting membrane before pus was reached, would have been far more skillfully treated with the trephine or drill.

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* "System of Oral Surgery."

† "Diseases of the Nose and Throat," vol. i, p. 465.

‡ "Normale und Pathologische Anatomie Nasenhöle," Wien, 1882, p. 137.

§ *Berliner klin. Wochensch.*, 1887, No. 13, p. 228.

The plan of treatment by the use of the drill or trephine should invariably be followed in all cases where relief cannot be obtained by attention to the nasal cavities, or by the removal of teeth known to be carious ; and the cavity may easily be approached at a point where, in the judgment of the operator, he can most skillfully carry out the requirements of the case. In this paper no attempt has been made to cover the whole ground of treatment, but simply to throw out hints that may lead to adequate discussion.

Dr. Phillips. I have one or two cases which I would like to demonstrate to you. I have a little patient who has a growth on the malar bone, that probably is an exostosis. When I light up the mouth, you will find that the growth will show very plainly. I will first try to demonstrate the illumination of the frontal sinus. I can do that so that you can see it in your chairs without moving.

(The little girl having the abnormal growth spoken of was here brought in, and the gas having been turned out, the electric light was applied and the frontal sinus illuminated, and also the antrum.)

Dr. Phillips. I want you to look as far as you can into this little girl's nose and see how beautifully the nasal cavity becomes lighted up. Then notice the light shining through her eyes. I will put the lamp into her mouth first. You can see the antrum perfectly illuminated, and you can see the difference between the left side, where the abnormal growth is, and the other side. If there should be pus in the antrum and the light does not shine through from the mouth, all you have to do is to examine the nasal cavity, and if there is pus in the antrum the nasal cavity will be dark on the affected side. If you look up the nose, you can see the turbinated bone without any trouble.

Now I will show you what is understood as the translumination of the larynx.

(A boy of about ten years was the first subject for this demonstration. Dr. Ottolengui offered himself also as a subject for the demonstration of the translumination of the larynx.)

Dr. Atkinson. Mr. President, I move a vote of thanks to the gentleman who has given us this paper and such beautiful demonstrations, and I ask that it be a rising vote.

The rising vote of thanks was unanimously given.

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* "System of Oral Surgery," p. 666.

The President. Gentlemen, we will proceed to the discussion of this very interesting paper.

Discussion.

Dr. Dwinelle. The question that has occurred to me is, Why is it that pus in the antrum does not transmit light while the surrounding parts do? My theory is this: pus is disorganized, degenerated, amorphous, and unpolarized, while the living tissues are polarized and in line. Pus, being degenerated and out of line and out of polar relations, will not transmit light. Is not that a good explanation? We know that sulphate of lime is obtained from crystals, which, of course, are polarized. When subjected to heat and thus calcined, the water of crystallization is thereby driven off, and it becomes an amorphous, anhydrous powder; by mixing it with water it is recrystallized into an opaque unpolarized crystal, the polarization of its particles having been broken up; they are not in line, and therefore light will not transmit through them, but the law of crystallization underlying the arrangement of their particles tend them back to their original typical crystal angle,—the sexagon, or six-sided,—which they faithfully observe. Cast a cube of plaster an inch in diameter, subject it to an intense heat for a while, and if then broken open it will separate into beautiful six-sided columns, showing how inflexible and immutable are nature's laws. It goes back to its original type of a six-sided crystal, though an opaque one.

Dr. Ottolengui. Mr. President and gentlemen, I will only say one thing about antral difficulties, and that is to relate a case in which the procedure was accidentally suggested to me, and as it was successful it may be instructive. We have frequently seen arguments by medical men in which it has been claimed that to reach the antrum it is not a bad plan to extract a tooth. A better plan—that of the essayist—is to drill through the malar process, which is the bottom of the antrum. I had a case once which I supposed was a simple alveolar abscess over the second bicuspid. I used a fine wire as a probe, and so much of the wire passed up through the crown and root that I knew I was opening into the antrum. I took my implantation reamer, the smallest size, and drilled a hole through the crown and along the canal into the antrum. A slight discharge of pus followed; with an aspirator I removed a considerable quantity of pus. The cavity was then syringed out, and there was a flow of fluid through the nares. The treatment was made through the cavity up through the root, and the root was temporarily filled. In two months the filling was removed, and the end of the root was found to have been covered over with new bone and the opening in the floor of the antrum closed. All disturbance of the antrum disappeared, and the affection of the nose also. In view of this, the question is, Why would it not be well sometimes to reach the antrum in this way? Because, whilst it is true that you can get into the antrum in many cases in other ways, some gentlemen have reported failures. The nature of this opening through the root seems to be one that closes more readily than an opening made through the maxilla elsewhere; there is not so much bone to be built up.

I am delighted with the illustrations here to-night, and I feel as though I wanted to go out early in the morning and buy an electrical apparatus.

Dr. Rhein. Mr. President, I can only re-echo the sentiments of the gentlemen who have discussed this subject, in feeling very thankful for the privilege of listening to the essayist of the evening. I appreciate very much the value which he, a practitioner in a different sphere from ours, places upon the teeth in saying we should not remove a sound tooth for the purpose of entering the antrum; in this opinion he differs from so many practitioners in his profession. The method which he demonstrated on the skull is certainly far preferable to that which is commonly advocated, of removing a tooth whether it be in a diseased condition or not in order to gain access to the antrum. The entering of the antrum is a procedure of much more frequent occurrence during the last few years than formerly, especially among throat and nose specialists. It has become almost the legitimate treatment, so to speak, in that line, for nearly every case of empyema of the antrum that comes along. In some dispensaries it is almost an every-day occurrence to make an opening into the antrum, and I believe they often do it when they should not; it makes no difference whether the tooth is sound or diseased, it is only a tooth, and as well out as not, and they extract it for the purpose of getting into the antrum. Consequently it was with a great deal of pleasure that I listened to the discrimination which the essayist made against removing a tooth for the purpose of gaining access to the antrum, whether the root is involved in the difficulty or not. Another point which he brought out was that all cases of antral difficulty are not necessarily the sequence of tooth-trouble, but that frequently a tooth-trouble which is supposed to be the cause is really a sequence itself. I think the essayist is somewhat mistaken in thinking that all dental authorities fail to recognize the fact that numerous tooth-troubles are a sequence of antral difficulties. I have a very strong impression that we can show a great many dental authorities that take the same view of the matter that he does. Making an artificial opening into the antrum is an operation that the dentist is certainly much more capable of performing with nicety than the general practitioner, and it is one that would pay all of us to practice on skulls for a while until we became thoroughly familiar with it, because when it becomes necessary to perform such an operation we do not want to hesitate very long about it.

In regard to the method described by Dr. Ottolengui, of entering the antrum through the root of the tooth, I am afraid I shall have to take the honors away from Dr. Ottolengui in regard to priority in that matter. It is rather an old operation. I first saw it demonstrated, I think, as far back as 1881 by one of the Drs. Wardwell. It was a case in which the antrum was treated through the root of a bicuspid, and they did not consider it anything novel.

Dr. Atkinson. Mr. President, this subject has become trite to me for so many years that I cannot tell when I began to deal with it from the stand-point of principle. I am glad to see to-night that we have had our minds pointed in that direction.

When the mucous surfaces between the superior, middle, and inferior turbinated bones have been occluded, we may look for deterioration within the antrum. Then, after we have made two openings in the antrum so as to wash out and cleanse it by means of a syringe, we are able to restore it to a healthy state. Usually, when those mucous surfaces that lie so closely together become agglutinated to such an extent as to produce a closed cavity, then they form to all intents and purposes an abscess.

When there is pus formed in the antrum, it is usually tumefied, which dentists have denominated an abscess or an ulcer, an ulcer being an open abscess; hence the nomination that we have heard to-night is inadmissible. The term empyema of the antrum does not hold good, because em, "within," and py, or "pus," and hæma, "blood," are the roots of the word "empyema." Students who are not thoroughly acquainted with the thing will be likely to be misled when they are impressed with the idea that the trouble means what the nomination implies. It is therefore something in the shape of an abscess or an ulcer that we have to deal with. What does that mean? It means the simplest form of deterioration of the mucous follicles, a retrogressive metamorphosis of the mechanism by which pus in place of mucus is secreted in the follicles. All that you need in the treatment locally is antiseptic treatment,—cleansing treatment.

As to the question of pulpless teeth being involved, in a great majority of those cases that come under our observation we find it to be true; but that does not really lead us to the physiological, pathological, and therapeutical indications that would enable us to master the conditions so as to be useful in our consultations with our brethren who are devoted to other specialties than dentistry. Dentistry is so very curious a specialty that it involves a knowledge of everything else; it requires us to understand all the things that physicians and surgeons require to know, and then we have to finish it out with mechanics and a clear perception of how agencies bring about certain reverses and the diabolism of deteriorated functioning.

I have not heard anything to-night to find special fault with, except the very general way in which the subject is treated. We think we have said a great many things when we have used a new term. Some men who use these terms have a sort of consensus of mental activity that is capable of retracing all the steps from a healthy to a diseased condition, through the different degrees of derangement, and are able to comprehend it, but that don't help the boys who do not know anything about it. Unfortunately, dentists have not been trained in the foundation principles of the process by which tissues are evolved from an amorphous mass; and that means the impregnated ovum from which the evolution takes place by which organs are formed; and when we are sufficiently acquainted with these physiological and embryological movements we will be able to deal with cases where we have to invoke the conditions which were originally invoked in the production of the tissues. All new forms of tissue have to climb the ladder exactly as the original production did, from an amorphous condition through the formation of the elements of the tissues, until each organ is developed up to the proper status by which the function of the organ may be produced in its finest elaboration. If we could understand just where we are, we would only need to have to arrest the retrogressive metamorphosis of the tissues, and the process by which the mucus and all the secretions and excretions are produced, to enable us to arrive at the means of arresting all the difficulty. And the best thing that I know of in this connection is pyoktanin, which means a pus-killer. It is a product of the destructive distillation of coal-tar, the aniline root of the alkaloids that come from the phenol roots in the process of destructive distillation. Pyoktanin was discovered by Dr. Stilling, of Germany. He has already published two papers on it, and the November number of *Merck's Journal* will have a third brochure on the subject. When you read the June, September, and October numbers of that journal, and the not-yet-out number, you will be master of the situation as far as pus is concerned. I have made three applications of it to soft chancres, and they have immediately healed. In a soft chancre as large as your thumb-nail, one application entirely destroyed all the pus, and granulation went forward beautifully. It appeared shiny, as all tissue is when the epithelium has grown together so as to make an entire surface. It is so nearly like the original tissue that I am indisposed to call it scar tissue. It is reproduced tissue; and this re-formation that is called healing by first intention is so nearly like the original tissue as to enable us to say that it is reproduced tissue and hardly to be called scar tissue. It will be of great advantage |for us to have a single remedy to take the place of the thirty or forty remedies that we have used, running through the whole curriculum before we have found one that exactly destroyed the particular microbe that was the antecedent of the inflammatory process that first destroyed the building-power of the tissues, or the forms of the tissues, which after that broke down and went through the solving condition that we call pus.

I rejoiced when I made the motion for the vote of thanks to the gentleman who has presented to us his paper, under the conviction that this is the line on which we must make our investigations if we expect to be masters of the situation and know the difference between guessing and knowing. As long as we do not know the morphology of these things except in an empirical way, we are not entitled to an opinion respecting that healing process which is generally and indiscriminately called granulation. We boys used to say proud flesh; that was well enough for the time. When the building power has been destroyed, it becomes effete matter, and must be got rid of so that the white and red blood-corpuscles, or embryonal corpuscles, which are the next step from the protoplasm that is wept out during the healing process, may take the field, and act by agglutinating the separate parts of the tissue so as to give a possibility of union.

Dr. Farrar. I sometimes enter the antrum by way of the nares,—a plan that has not been mentioned this evening. I use a tube about six or eight inches in length and about the size of a large knitting-needle, oval at the end (the end being closed), and having several holes in the sides near the end. This tube, which is slightly spiral in form, I pass up the nose, thence between the turbinated bones into the antrum. There are two of these tubes, right and left. In making them, I used a skull to get the form that enabled me to pass up through the nose and through the opening into the antrum, thence to the bottom of it. With these instruments I am able to make my diagnosis, and oftentimes treat the case without extracting a tooth. But this electrical process which has been explained this evening bids fair to excel every other plan that I know of. I want to get the apparatus at once, for I see great possibilities from its use.

I agree with Dr. Ottolengui and never extract a tooth unless it is a bad one, a very bad one. I never extract what might be called a good tooth, even if the pulp is dead. I know from experience that to reach the antrum through the canal in the root of a tooth is good practice. I have filled roots with wire similar to the plan suggested by Dr. Ottolengui. I think that I published that plan of filling roots somewhere in a series of papers on alveolar abscess and antral disease, in 1879, in the *Missouri Dental Journal*.

Dr. Phillips. May I ask the gentleman if he ever found cases where he was unable to introduce a tube through the nares?

Dr. Farrar. I never have yet. If I were connected with an infirmary I probably would meet with such cases.

Dr. Ottolengui. Mr. President, when I related the method of entering the antrum through the root of a tooth I, in my ignorance, supposed it was new, but I did not wish any credit for it. I am glad to know that other gentlemen have heard of this plan before. I mentioned it because I thought it was new.

Dr. Smith. Mr. President, I would like to ask, in reference to the illumination of the antrum, whether I understood the essayist rightly to say that in cases where pus was present there would be a dark spot where there would be no light or redness. I noticed in his illuminations that everything was completely red; and I would ask whether if pus were present everything would be dark?

Dr. Phillips. I regret that I have been unable to find proper subjects for these illustrations. I have searched the dispensaries of New York during the past week to get a case of antral disease to bring here to-night, and I could not find one. But if you should meet such a case, by translumination you will find darkness over the affected side. And if you are a little uncertain, look into the nasal cavity, and that also will be dark if there is pus. I suppose the light will shine through the cheek low down, but not through the bone.

The President. Dr. Phillips, will you close the discussion?

Dr. Phillips. Mr. President, I have very little to say except to tell you how grateful I feel to you for your very hearty approval of the paper I have read. I must confess that I have met with far less opposition than I expected, especially in connection with the treatment of antral diseases. During the last few weeks I have made a pretty careful review of the works on oral surgery, and I must say that I failed to find a book that would any more than say that occasionally a case of antral disease might be due to an extension of nasal disease; almost invariably the cause was attributed to inflammation from a carious tooth. Now, I do not believe it. I believe that many times these cases come as an extension of nasal disease, or are due to the occlusion of the ostium maxillare. If antral inflammation of a catarrhal nature be set up, and is not checked, you will get eventually a purulent inflammation.

I have noticed also that there has been a little question as to the healing up of the opening made into the cavity by means of the trephine or drill. I believe that some of the works on dental surgery lay stress on this point, especially Professor Garretson's last work. Bone will heal in other localities, and why will it not heal here? If you make an opening in the skull, new tissue forms and it soon closes. I believe that some of these cases that are reported did not heal because the process of inflammation has not been checked. If you cure the antral disease, the opening in the bone will heal up. I heard one of your professional brothers say that he had a case where he drilled through the root of a tooth into the antrum, and afterward had occasion to extract that tooth, and he found that a new bony growth had taken place over the end of the root. I think it is natural to suppose that an opening made in the antrum will close when the disease subsides. I think that in some cases you would be justified in opening the antrum through the floor of the nose. Of course you will not get into the bottom of the cavity in that way, but that is hardly necessary. I recently saw a case of peritonsillar abscess that opened spontaneously high up. I took a probe and went down into the bottom of the abscess to make sure there was no other opening. The pus discharged itself, and the abscess healed in three or four days. If the proper treatment is carried out, I see no reason why this opening should not be made through the floor of the nose. There can be very little question, however, that the best place to open the antrum is external to the alveolar arch and underneath the antrum, and it does not require very much skill.

I think I ought to go one step further than I did in my paper where I said a sound tooth should never be extracted. After the very valuable discussion that I have heard here, I want to go further and say that I do not feel that even a suspected tooth should be extracted until there is a certainty that it is diseased. There is no harm done by going into the antrum ; it is not a thing that we should pause over half as much as the extraction of a sound tooth, or even a suspected tooth.

In regard to the pus question and pyoktanin : I have had occasion to use pyoktanin a good deal, and to my mind it is a medicine that has been overrated just as much as cocaine was overrated, just as much as carbolic acid was overrated, or as much as any of the new things that come out are overrated. Pyoktanin will take its place in medicine ; but it is one of the nastiest remedies that you ever put your hands into, on account of the discoloration caused by it. I used it in one case where I was nearly discharged from attendance upon the patient on account of the destruction of clothing. It certainly does bring about good results ; but I have known some twenty or thirty in our profession who have abandoned its use simply on account of its destructiveness to garments and bed-clothing. You can tell a surgeon who has used it as far as you can see him, by the color of his hands. While the discoverer of that medicine lays great stress upon the blue powder, in my experience the yellow powder has brought about the best results. In a case of peritonsillar abscess I made an injection of the yellow variety, and within twenty-four hours the formation of pus had entirely ceased. In antral diseases I think it deserves a fair trial.

Gentlemen, I thank you very much for your attention.

Dr. Atkinson. Mr. President and gentlemen, I want to defend pyoktanin from the charge of nastiness. To remove the stain of pyoktanin, apply dilute hydrochloric acid. I do not think color means nastiness. Nastiness means something that is repugnant and offensive. I have not yet seen a case where there was any nastiness. I acknowledge that it stains, and I have therefore advised care in using the remedy. The great advantage of this pyoktanin is in its filling a need that nothing we have known before has filled ; and that is its penetrating power, that kills the microbes and does not interfere with the metabolism of the healthy tissue. The men who found that out were the oculists, who had to deal with morbid growths. Where there is something that is not normal in the eye, there will be a stain just above it, that gives an opportunity to know just when the scissors have gone far enough to remove the deteriorated condition. Pyoktanin is not nasty. I protest against calling it nasty simply because it discolors things with which it comes in contact. Ten per cent. of muriatic acid in ninety per cent. of water will remove such stains, and has not power enough to interfere with the health of the tissues. A ten per cent. solution is probably pretty nearly that which we find generated in the normal processes of digestion in the stomach.

Dr. Phillips. I would like to know if anyone has made experiments with pyoktanin in relation to dentistry, and whether it has any bad effect on the dentine of the teeth. I think the doctor has fairly taken me to task for my word nasty, and I am willing to withdraw it. What I mean is that if you were to use it as I did, and have the misfortune to have a little error made by the nurse, and have this blue stain work its way through a valuable mattress or bed-clothing, you would soon get into trouble ; and the dilute hydrochloric acid does not take it out either. It will remove it from your hands, but it will not take it out of your coat or your vest or anything of that kind without leaving some kind of a stain behind.

Dr. Atkinson. It cannot possibly harm the dentine. It does not discolor the dentine. It discolors the dentinal fibrillæ that are in the dentinal tubules. The dentine proper is lime-salts so arranged as to constitute the tubes in which are what are called the dentinal fibrillæ, about which there is a dispute. Tomes says they are nerve-fibrils, and others say they are not. But as long as they conduct sensation we may properly call them nerves. Pyoktanin will stain them if you continue it long enough. It is too new a thing for us to jump at conclusions regarding it. You may ask for blue pyoktanin and get green. There is a fine discrimination. It is an acid that is not very marked. It is doubtful whether it is an acid or an alkali. Either the yellow or the blue will produce an alkaline effect. Its molecular construction is so very complicated that it puzzles the very best chemists. Professor Charles Mayr, of Springfield, a thorough and careful chemist, said he could not carry in his mind the complicated character of the different forms of pyoktanin so as to make it clear, and he would have to take some time to answer the question as to the different chemical forms of the blue and the yellow pyoktanin.

Dr. Dwinelle. There are various methods of perforating the antrum, and it is desirable of course to enter it at a point corresponding, if possible, to its lowest level to facilitate drainage. In a case recently I punctured the antrum with a large drill through the palatal arch at a point corresponding to the extremity of the palatal root of the first molar. This afforded free drainage, and gave me the opportunity to explore and medicate the antrum, which resulted in the entire cure of one of the most extensive cases of disease I ever met with.

Adjourned.

B. C. NASH, D.D.S., *Secretary.*

UNION CONVENTION OF THE FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Concluded from page 982, vol. xxxii.)

SECOND DAY—*Afternoon Session.*

THE convention was called to order on Wednesday, October 29, at 2 P.M., President Hofheinz in the chair.

The first paper read at this session was by Dr. F. W. Low, of Buffalo, and entitled "Phagocytosis," but it was not furnished for publication, and consequently the somewhat extended discussion on it would be out of place here.

The president announced as the Business Committee for the next meeting the following: Drs. A. Retter and F. W. Fisher, of the Fifth District; E. D. Downs and F. B. Darby, of the Sixth District; W. F. Arnold and B. S. Hert, of the Seventh District; and C. S. Butler and F. W. Low, of the Eighth District.

Dr. Chas. S. Butler, of Buffalo, read a paper upon

DENTAL EDUCATION.

He thought that the subject had never commanded so much attention as now; that never before had the whole body of the profession been so impressed with the necessity for better facilities for teaching and a more thorough training of students. He referred to the liberal provisions made by States and by the nation for the advancement of the arts and sciences, and the generous support which had been given by the government to the study of astronomy, geology, climatology, and kindred sciences. Medicine, however, from the days of Hippocrates to the present, had been compelled to fight its own way and establish its own systems. The saying is especially true of dentistry, which, like "the spider spinning its web out of its own inwardness," has developed unaided. It is well known that medicine and surgery, wrestling with the unsolved problems of the human system, failed at the opportune time to comprehend the importance which attaches to the care and preservation of the teeth, and thus by force of circumstances a separate and independent school for teaching the science and practice of dentistry was established. Since that time dental colleges have enlarged their curriculum of instruction and have endeavored to afford the fullest opportunity for the impartation and acquisition of knowledge. But they have been compelled to accommodate themselves to circumstances and make the most of limited resources. Growing out of this condition is the mercantile element or commercial spirit which seeks for large classes, making quantity rather than quality the standard of success. To eliminate this element, to make quality rather than quantity the standard, should now be our ambition. The great problem of education is to secure, in due proportion, instruction and the development of the mental faculties,—the chief difficulty alike in the common education of childhood and the special education of later life. The object of teaching should be to impart facts so as to educate the mind in scientific thought, that it may be able to found a correct judgment. To determine which is true and which false, to be able to arrive at just conclusions, is of far higher value than mere memorizing of facts. Dr. Watts has said, "The instructor should not only be learned in the science which he teaches, but have skill in the methods of teaching, and patience in its presentation." Truths are only effectively taught by those who have been tempered for their work by the glow that comes from a growing insight into some chosen mental field. It is men thus trained and disciplined that are desired as teachers in our profession. Those at present connected as teachers with our institutions are educated, experienced, and devoted, but who of them all is not required to divide his time, energy, and thought between his daily practice and his hours of teaching, between the necessity for bread and the desire to impart knowledge? Is not the time ripe for the dental profession in furtherance of higher education to establish a national dental school,—an institution for which it would select its own teachers, direct its own affairs, and be so chartered as to receive endowments and establish chairs in special departments, as is the case with so many of our foremost theological and scientific institutions? Such a school would not interfere with those now in existence, but would, on the contrary, help and stimulate them in many directions. An institution organized and conducted on these principles would afford the opportunity for uninterrupted investigation and study, and be the means of keeping progressive and scientific men at their best work. Everywhere is felt the loss already sustained in that Miller, Black, Andrews, and other equally conscientious though less known workers have been unable to give themselves wholly to study, investigation, and instruction. Whether the dental profession is to maintain separate and distinct institutions of learning, with a separate degree as now, or whether dentistry and medicine shall be taught in the same institutions, by the same teachers, and with a common degree, is a problem not yet solved ; but the essayist desired to put himself on record in the statement that medical colleges have thus far failed to make dentists.

Discussion.

Dr. H. A. Birdsall, of Buffalo, said our countrymen had the reputation of thinking they knew everything. What is education for? Is it not that we may fit ourselves to serve the cause of science and humanity? The paper pleads for higher attainment in the education of the dentist, and we must certainly all agree that that is in the right direction. We cannot set our ideal too high. When papers like this are written, the promise for the future grows brighter. We are impelled to look about us and see how we can best attain our object. We cannot expect much from government, but we can look with hope to good educational institutions and to progressive dental journalism.

Dr. W. C. Barrett, of Buffalo, said the first thing to be done for dental education is to settle what is the trend of thought in the profession, and then to act upon it. There is some difference of opinion as to whether it were best to separate from medical institutions or to co-operate with them. We need first to harmonize our differences, and then the way will be made more clear for a higher performance.

Dr. W. H. Atkinson. Educational work is needed in the nation. We had universal suffrage, but the tendency of universal suffrage was in some respects damaging to progress ; it gave us many public officers whose character was not of the right stamp. So with some of our great institutions of learning ; we cannot say that Cornell University, and Girard College, and Johns Hopkins have been what they ought to be : they have failed in many respects. If this be so, what can we look forward to for dentistry in the way of higher education? We can attain much if we work together without selfish ends.

Dr. Barrett. Education is not necessarily monopolized by the schools. Go up-stairs and look at Ward's exhibit of comparative anatomy. How many of us can tell to what class or order a skull there belongs? If we wish to understand all about the human teeth, we must be students of comparative anatomy.

Dr. Atkinson said that if he got his usual inspiration he would probably talk too long. He would say, however, that if we want better dentists we must have higher teaching. If we would be truly erudite in our profession we must study dental histology ; we must get down to the final elements of the dental tissues. Still more, we must get such enthusiasm as will make our studies dear to our hearts, and this will quicken our apprehension and broaden and deepen our education.

Dr. W. W. Walker thought that the difficulty is with dental legislation. Colleges are too loosely organized. Until legislatures stop granting charters so freely, we cannot make much progress. Our colleges must be run without mercenary motives. There is need of reform in that respect. Much is being done by the National Board of Dental Faculties. Three years' college courses have been established. Our boards of dental examiners must force the law-makers to reform, and demand a stricter accountability. The New Jersey law requires all entering practice in that State to pass an examination before the examining board. Its object is to keep out incompetent practitioners. Dr. Walker believed it to be a good requirement, until dental legislation took higher ground in the matter of establishing colleges.

Dr. J. E. Almy, Jamestown. Examination before the boards of examiners is a good requirement. We want a good, strong standard of qualification in all the States.

Dr. W. C. Hayes, Buffalo, thought dentists could do a little missionary work among their patients by asking them to elect the proper men to make better laws.

Dr. S. B. Palmer, Syracuse, thought that dental students should get some practical experience and acquaintance with dentistry in the dental office before entering the dental college. He had learned more in that way than he had from books.

Dr. Butler. Cannot the profession itself do something in the way of establishing a national school for preliminary education for dental students, many of whom now enter college without fit preparation? We want an institution with the commercial element eliminated, and supported by the profession itself by endowment. We want an institution that will develop scientific dentists. Are we not strong enough as a profession to establish such an institution?

Dr. J. W. Cowan, of Geneseo, read a paper entitled "The Country Dentist and what is expected of Him," in which he urged recent graduates to locate in country towns or villages in preference to large cities. He believed there was quite as much if not more money to be made in the first ten years of practice in the country than in city practice, conceding that the graduate has ability, does not underrate the intelligence of his patrons, and compels their respect by proper charges for his operations. The country dentist should work by appointment and charge for lost time precisely as though he were located in a city. Above all, he should devote his spare time to study, research, and experiment, and keep abreast of the times by systematic reading of the best dental periodicals.

Dr. W. A. White, of Phelps, thought intelligence as essential to the country as to the city dentist,—indeed, in many cases, more is demanded of the country practitioner, for he is often called upon to treat diseases of the oral cavity which the city dentist would turn over to specialists. There are some disagreeable phases in village as in city practice, but on the whole the country practitioner had pleasanter experiences than are met in city practice.

Dr. F. W. Low, of Buffalo, facetiously related the case of a carriage-painter who went into dentistry in Wyoming county. A young graduate tried to have him indicted for illegal practice, but the grand jury indicted the student instead for malicious prosecution. He mentioned the case, which he knew to be a fact, as illustrating the obtuseness of juries and the uncertainties of country practice. In the matter of prices, he thought success in country practice was more precarious than practice in the city.

Dr. Cowan said his experience was that country patients paid as liberally and as promptly as those in the city.

Dr. J. C. Gifford, of Westfield, was one of the unfortunates located in the country, and he had managed to get fair prices and a good living there for over thirty years.

Dr. W. C. Barrett's experience was that the most unprincipled quacks were generally confined to the city.

Dr. Hayes believed that a man must be a better all-around dentist in the country than in the city. It requires a good practitioner to succeed in the country.

Adjourned.

The banquet took place in the evening, at the hotel where the convention met, and was almost universally attended by the members of the convention, besides many prominent citizens and representatives of educational institutions of Rochester and vicinity.

THIRD DAY—*Morning Session.*

The morning session on Thursday, 30th, was called to order at 9 o'clock, President Hofheinz in the chair.

Dr. William Carr, of New York, read a paper on

DENTAL LAW.

Dental and medical laws are an assertion by the people of their police power for their own protection. Primarily these statutes are not and should not be enacted for the benefit of dentists or physicians as classes. Such legislation is defensible solely upon the theory that, inasmuch as ignorance and malpractice in any branch of medicine are followed by consequences serious to the health of the individual, the public has a right to demand of those desirous of attending to their bodily ailments proofs of fitness for such calling. Building regulations have the same purpose, but there is no need of requiring special qualifications of the individual builder. His work can be regulated and supervised by inspectors appointed for the purpose ; but as it is not possible to supervise the work of the general or special medical practitioner, or to estimate the relation of his ignorance to unfavorable results in a given case, the state has no other method of protecting its citizens than by laws defining who may and who shall not practice. This, briefly, is the ground upon which medical and dental laws have been declared constitutional by the highest courts.

Incidentally in the enforcement of such laws the professions gain in public esteem. It is lamentably true, however, that under the diploma system of license corporations have sprung up with the single purpose of making money by licensing practitioners of medicine and dentistry regardless of their qualifications. As a result, the degrees of the best colleges have suffered more or less in public estimation for want of distinction between them and those of the diploma mills. The disesteem into which American diplomas have fallen abroad is not without some show of reason. It seems scarcely open to argument that laws requiring proof of education of candidates for medical license are just and desirable for the public weal. When such laws are administered so as to secure a high standard of qualification, they act beneficially by excluding incompetency, lessening the competition of the ignorant with the learned, the unskilled with the skilled. That the charlatan should be excluded is certainly not to be disputed.

The good done by the enforcement of such laws is not to be measured by the number of prosecutions or convictions. The publicity given by a conviction is a deterrent to others ; and the more rigorously the law is enforced, the fewer persons are likely to expose themselves to its condemnation.

Dr. Carr advised against an enforcement of the law in a harsh or technical spirit ; advocated leniency when the offense has been committed in ignorance, and where there is an ability and willingness to comply with the statute, and to press for conviction only where a deliberate and persistent intent to avoid the law is manifested.

Discussion.

The discussion on Dr. Carr's paper was quite extended, but much of it was of a local character in reference to cases under the New York State law, raising funds, jury duty, etc.

Dr. Barrett asked what were the sentiments of the rural districts in reference to the workings of the law and its enforcement.

Dr. Carr said it was in a large measure a question of educating the people as to the value of the law. The courts would undoubtedly sustain it, and they hoped by spring to have decisions in its favor.

Dr. Howard. Does a dentist have to register when he changes his county?

Dr. Carr. He must register in every county in which he practices.

Dr. Carr was instructed by resolution to endeavor to procure an amendment to the law by which all dentists in the State shall be exempt from jury duty.

Dr. A. P. Burkhart, of Dansville, then read a paper on the subject of

Tin and Gold in Approximal Cavities.

Superior incisors and cuspids which directly occlude with the inferior teeth and are thus worn or abraded squarely upon their cutting-ends, are frequently found to be approximately carious, and therefore present peculiar difficulties in the preparation and filling of the cavities with gold. Such teeth appear proportionately short because of the loss of substance from their cutting-edges, which are thick and usually show a considerable stripe of dentine between the labial and lingual plates of enamel.

In the case represented by Fig. 1 it will be observed that the approximal cavity extends from near the gum margin well down toward the cutting-edge, and that there the uncovered dentine is so thin at the mesial approximal corner that an anchoring pit, such as is usually made, would be an additional element of weakness for two reasons: first, the remaining corner is often found, on critical examination with a magnifying glass, to be checked, and the pit would involve a loss of the enamel retaining dentine at that point; and second, the liability of fracture by continued wear upon the unprotected corner would be increased by an anchorage pit.

Fig. 1.

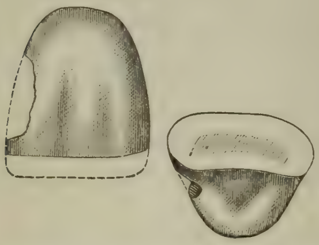
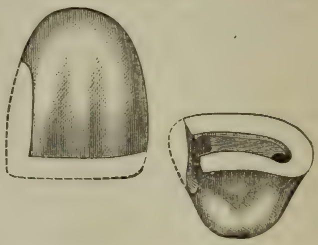


Fig. 2.



My method of procedure in such a case is to prepare the upper portion of the cavity by cutting a groove in the dentine with a very small round bur at the cervical part, and at either end of the groove drill small shallow pits for anchorages. The thin, sharp corner at the cutting-edge is then cut carefully away with a file or thin disk, and the cavity edges made quite smooth so that the front of the tooth will appear as shown in Fig. 2. With a small, sharp inverted cone bur (No. 34) a groove is cut in the worn end of the tooth from the cavity to near the opposite side, where a small anchorage pit is made as illustrated by Fig. 2. The enamel on the labial face may often be thus left protected by a small portion of the dentine, while the palatine face will be cut somewhat away in securing strength of enamel-edge at that part. The prepared tooth is well shown by Fig. 2. The filling is begun in the upper pits and groove, and built downward solidly to near the cutting-edge. Another start is made in the anchorage pit at the farther end of the edge groove, which is progressively filled until the approximal filling is reached, and the two solidly welded and completely contoured (Fig. 3). In any case I should cover the enamel cutting-edge with gold, and then dress off only so much as should be found necessary for occlusion (Fig. 4). If the incisors and cuspids are all abraded, I should contour the edges also as shown in Fig. 5, which represents the finished filling. Indeed, I should in some cases dress off the lower incisors round and smooth, because the wear of smooth enamel on gold would be much slower than that of tooth on tooth.

FIG. 3.

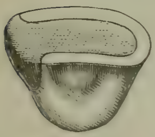


FIG. 4.

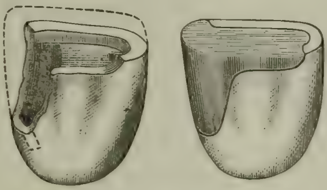


FIG. 5.

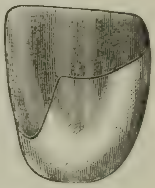


FIG. 6.

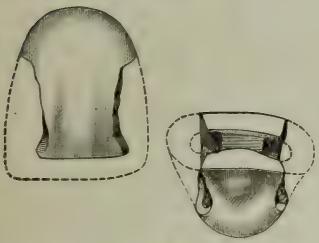
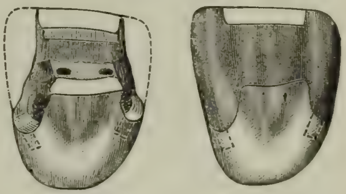


FIG. 7.



It is obvious that this method of operating is applicable to teeth that have been still further abraded, or where there is a complication with both mesial and distal approximal cavities as seen in Fig. 6. In a like instance two anchoring pits are made in the cutting-edge groove, but when that is impracticable, the groove may be so shaped as to make the connecting filling a very strong bond of union. Such a completed filling is shown in Fig. 7. The matrix is a valuable aid in the building and contouring of teeth which have but thin shells of enamel left, and the described method of procedure is adaptable to whatever kind of matrix may be preferred.

Dr. G. P. Rishel, of Hornellsville, read a paper entitled

Methods and their Relation to Success.

The essayist commented at some length upon the wide difference between the methods taught and practiced by the best operators and those followed by the average practitioner. He alluded to the strong opposition which formerly existed to the use of cohesive gold and the restoration of contour,—an opposition which has almost disappeared, though it had been long maintained, chiefly on account of the faulty or careless methods of some of its advocates. Contour work, when properly done, protects frail margins ; secures the greatest possible amount of masticating surface ; prevents food from being crowded between the teeth, and last, but not least, insures the most perfect self-cleansing surfaces attainable. These results, however, can rarely be secured without such a thorough separation of the teeth as to permit easy access to every portion of the cavity during the insertion and finishing of the filling. This sin of omission is followed by a train of easily foreseen evils, involving recurrence of decay at the cervical margin, death of the pulp, or even the loss of the tooth, thus adding another count to the indictment found by opponents of the contour system. He deprecated slow separation by the rubber or wooden wedge, and urged the adoption of appliances for quick separations, and for such operations that when the teeth returned to their normal position the knuckle or point of contact will insure a permanent separation at the cervical, and in most cases at the buccal, labial, and palatal margins. When the teeth are of inferior quality, it is often extremely difficult to decide between esthetic demands and possible failure on one side and durability on the other. The decision rests upon sex, social status, and the means of the patient. Of one thing we may feel assured,—frail margins in contact or almost in contact will eventually prove a disappointment to practitioner and patient, and furnish the "New-Departurists" with proof of the incompatibility of gold and dentos.

Pulpitis is frequently the result of thermal changes. In the treatment of large cavities, reaching almost to the pulp, no metallic filling should be inserted until after the introduction of a lining of copal or sandarac in ether, followed, if possible, by cement. In some instances inflammation is caused by pressure from mastication, the thin layer of dentine overlying the pulp receiving almost the entire shock. This occurs most frequently in large cavities in the grinding-surfaces of molars, and may be prevented by beveling the margins so that the filling is in great measure supported by and partially suspended from the grinding-surface of the tooth. The adaptation of this principle may be made especially useful in protecting frail labial surfaces in the incisors.

The relation of methods to success is nowhere more thoroughly demonstrated than in the treatment of pulpless teeth, upon the preservation of which must depend the comfort of many of our patients. Since the introduction of bridge-work the importance of proper treatment of such teeth cannot be overestimated. More failures can be justly charged to misdirected efforts to enlarge pulp-canals and to our treatment than to all other causes combined. The practice of immediate root-filling was recommended. With slight enlargement of the canal, easily and safely made by Donaldson's reamers, medicaments can with an abscess-syringe be forced through the foramen, the abscess broken up, and the root filled at the same sitting. The employment of a solution of bichloride of mercury in peroxide of hydrogen, continued until effervescence ceases, will give satisfactory results. Dry the canal, introduce carbolic acid, dry again, and you need not hesitate to fill at once. The essayist claimed two years' experience and a record of nearly two hundred cases by this method without one failure.

Discussion.

Dr. F. E. Howard, of Buffalo, said that Dr. Rishel had thrown out some valuable hints. In the matter of wedging, he agreed with the essayist that there was no longer any excuse for using the painful rubber. More satisfactory results can be reached in better ways. Rapid separation saved time for the operator and pain to the patient. As to the treatment of root-canals, they can be opened up and filled at one sitting, but a great deal depends upon the judgment and skill of the operator as to success or failure. Bridge-work has now been brought to such a state of perfection that, where crowns are lost through the carelessness of either patient or operator, a completed denture of bridge-work becomes a source of great usefulness. If skillfully made, satisfaction is a pretty sure result.

Dr. J. H. Beebee, Rochester. Quick wedging is desirable, but in some cases you cannot do it. In slow wedging he had found ordinary cotton wrapping-twine useful.

Dr. A. P. Burkhart, Dansville. Every man must judge for himself, from the case in hand, what is the most satisfactory method in separation.

Dr. Rishel said he generally used the Perry separator, of which he had an entire set. The Universal separator was good, but he had found Perry's the most satisfactory ; it had the advantage of absolute comfort to the patient.

Dr. C. W. Stainton, Buffalo. Can you use it for separating cuspids and lateral incisors ?

Dr. Rishel. The Perry separator cannot always be used at that point.

Dr. W. A. Barrows, Buffalo, spoke of the desirability of a case-book, in which every stage of an operation should be recorded for future reference. He had often wished he had kept such a book, and believed it would be practically useful.

Dr. Howard said he did not let anything of importance pass without some note of record, either by diagram or otherwise, for reference. He even records the use of a new filling-material. In capping pulps, he found his record very valuable.

Dr. Rishel said he used Pettit's register, which had special diagrams, and which he had found a very valuable book for his own purpose.

Resolutions of thanks were passed to Professor Ward for the fine exhibit of comparative dental anatomy by Ward's Natural Science Establishment, and to the Bausch & Lomb Optical Company for their microscopical exhibit.

Some discussion arose as to the methods of the Dental Protective Association in the matter of the Tooth-Crown Company's claims.

Dr. Burkhart thought there was ground for complaint that the association had sent out misleading circulars, in that they did not explain that protection could not be afforded to dentists who had signed a license with the company.

Dr. Howard thought the association was trying to act fairly ; it had given advice which, if acted upon, would protect dentists against the claims of the company.

Dr. Burkhart thought the association was derelict in omitting to state that dentists with a license from the Crown Company could not ask for protection. They should have said so.

Dr. Butler. If you sign a license with the company, you debar yourself by contract.

A voice. The circulars of the association have been explicit in stating that those who wanted its protection must unite themselves with it before suit was brought.

Dr. Miller said that Dr. Crouse had assured him that few Western dentists were taking out licenses.

Dr. Beebee wished to suggest to the convention the propriety and usefulness of a room for a museum ; he thought provision should be made for temporary exhibits of casts, specimens, anomalies, and new appliances at each meeting.

On motion, adjourned to meet in Buffalo on the last Tuesday of October, 1891.

UNION DENTAL MEETING WITH THE NEW ENGLAND DENTAL SOCIETY.

(Continued from page 969, vol. xxxii.)

SECOND DAY—*Evening Session* (continued).

DR. THOS. FILLEBROWN said that Dr. Crouse had expected to be at this meeting, but, finding it impossible, had asked him to present the claims of the Dental Protective Association, and to explain that its object was to protect dentists from unjust exactions by the holders of illegal patents. Its work will not end with its contemplated victory over the International Tooth Crown Company, but it will stand between its members and any future exactions of the same character. In reference to the pending suits, he said they would be brought to trial as soon as the association could get them before the courts. The association engages to defend all suits brought against its members by the International Tooth Crown Company. There is one point which he desired to have made plain. Some dentists have signed an agreement with the Tooth Crown Company not to question the legality of their patents, and have contracted to pay the license, even if the patent should be declared void. It is just as much to the interest of such persons to join the association as it is to that of any others. The courts would certainly protect any man from having to pay royalty after the patents had been decided void.

Dr. L. D. Shepard said he thought prompt steps should be taken at once to get as many new members as possible to join the association, and he hoped the several State societies represented in the convention would each appoint a committee for that purpose.

Dr. S. C. G. Watkins, of Montclair, N. J., was introduced to the convention, and called attention to the action of the First District Dental Society of New York and the Central Dental Association of New Jersey toward preventing the further issue of patents for operations in the mouth. They claimed that patents for the application of crowns and bridges, and many others of like nature, were unjust.

Dr. M. W. Foster, of Baltimore, Md., addressed the convention upon the status of members of the dental profession in the estimation of the Census Bureau. Every dentist in Baltimore had received a list of questions to be answered regarding the dentures made, as though they were manufacturers and not professional men. A committee had been appointed to confer with the officers of the Census Bureau in regard to the matter. They had made their protest to the superintendent of census, and had received a reply thereto stating that the term "mechanical dentistry" is intended to mean that branch of the profession which includes the manufacture of artificial dentures, such as plates, crowns, caps, etc., which are manufactured wholly or in part outside of the mouth and afterward inserted. The superintendent thought there could be no doubt that such features of the profession are clearly within the limits of the census inquiry relating to productive industry, and as such are, under the law, to be included in the table of manufactures, and that returns should be made by all dentists who may be engaged in the manufacture of artificial dentures.

This rating had met with the decided disapproval of the profession in that city, and they have agreed not to answer the questions, and would fight the matter through the Supreme Court if necessary.

THIRD DAY—*Morning Session.*

The convention was called to order at noon, President Clements in the chair.

Dr. Julien W. Russell, of Brooklyn, N. Y., read a paper entitled

A REVIEW OF COPPER AMALGAM.

Dr. Russell spoke of the controversy which had been excited regarding the use of copper amalgam, denounced on one hand as worthless, and commended on the other as superior to almost any other material. Tests had been reported which apparently demonstrated its worthlessness, and other tests which proved it to be a perfect filling-material. The enormous amount of copper amalgam which has been sold and used is another instance of the tendency to a blind adoption of a new theory or new remedy without sufficient consideration. Thus, while a material or a method may be beneficial in certain cases, it is used by many indiscriminately, and consequently there are many failures, and then utter condemnation. Dr. Russell said that he had made many experiments with copper amalgam, and compared results with other dentists with whom he had opened correspondence.

Those who oppose the use of this material claim that it possesses no antiseptic properties; that in certain mouths it is soluble; that detached particles discolor adjoining teeth, and that there is great danger of constitutional effects from their absorption,—salivation or copper-poisoning,—aggravating some diseases and antagonizing relieving remedies. It is also claimed that it is subject to shrinkage, allowing moisture to penetrate between the filling and the walls of the cavity, causing a deep discoloration of the tooth ; that it wastes at the cervical wall and becomes soft.

On the other hand, it may be stated that a large number of tests, under a great variety of conditions, prove that it does not shrink to any appreciable extent. The only signs of leakage were when the amalgam has been used too dry or too soft.

Discoloration of tooth-structure may result from either of three causes,—defective manipulation, as above, in teeth of poor structure which are permeable by moisture, resulting in an oxidation of the fillings (beneficial rather than injurious in such cases, as it hardens the tooth-substance), or the use of an impure preparation.

Dr. Mitchell, of London, claims that when copper is used which has been precipitated by zinc or iron, double sulphides are formed which will inevitably produce discoloration. In a tooth of dense structure, with the use of a pure material and a careful insertion of the filling, he doubted if any discoloration would result. The cause of a wasting of such a filling is generally to be found in an acid condition of the saliva ; the remedy is to cover the filling with gold or an alloy. Where the cervical part only of a filling is softened, it will be found to be in cases where there is an erosion along the gum margins, supposed to be caused by acid mucus. He had never found any wasting where the secretions were alkaline or neutral. He did not think there was much force in the idea of systemic disturbance from absorption.

Copper amalgam must always be used with good judgment. Greater care is required with it than with alloys, as well in the manipulation of the material as in the insertion of the filling. The true position of copper amalgam as a tooth-saver is not in competition with gold, silver, or cement, but its place is where experience has shown that other fillings have failed,—on the buccal surfaces and the large approximal cavities of molars, especially where they extend under the margin of the gum ; in cavities beyond the reach of the tooth-brush ; as a lining for frail teeth, and for preserving the deciduous teeth and sixth-year molars in the mouths of children.

Its manipulation is very simple. Heat it slightly, grind vigorously —the more it is ground the better ; when amalgamated, squeeze out the surplus mercury, until the mass is of the consistence of the ordinary alloy amalgam. In inserting the filling use small pieces, and burnish from the center to the sides of the cavity. When the filling is complete, smooth the surface gently, drawing the burnisher lightly from center to edge. Allow it to harden, and finish in the usual manner.

In using copper amalgam and gold in the same cavity, do not add the gold while the amalgam is still soft, as the mercury that amalgamates with the gold does so at the expense of the copper, and the filling is apt to be porous. The better plan is to insert the amalgam and cover it with a temporary filling until it hardens. Then cut retaining-points in the amalgam, and complete with gold.

If moisture is thoroughly removed from a cavity which contains a certain amount of decayed tissue, and copper amalgam placed in it, the decay will still progress ; but if a small quantity of moisture is left, an oxide of copper will be formed, and further decay prevented. This is decidedly the best method for preserving the deciduous teeth, discoloration, the only objection, being of little consequence. Teeth filled in this manner three years ago are still in perfect condition, and likely to last as long as they are needed.

These are the lines in which success with copper amalgam can be secured. It does not offer any reward for poor workmanship, but requires the best judgment and the highest skill to obtain the best results.

Discussion.

Dr. I. J. Weatherbee spoke in absolute condemnation of the use of copper amalgam, which he thinks is the blackest black sheep in the whole lot of amalgams. Some think it serves a better purpose than any other filling, because by its peculiar properties it bids defiance to the whole tribe of microbes,—that it puts them all to sleep and keeps them harmless. But this is not so in all cases. He had removed copper amalgam fillings which had been inserted by men who were capable of doing good work. One case had been in for a year, and there was partial decomposition at the cervical wall. Another filling had been in two years, and there was decomposition of the filling with some decay of the tooth-substance. These were fillings put in for economic purposes, but he had charged at the rate of ten dollars an hour for drilling them out. It is claimed that it is an absolutely sure filling, yet he could have filled the same cavities with gold or tin and preserved them longer. He knew that it is a very easy thing to dabble with plastic fillings, to putty up a cavity, and imagine that one is practicing dentistry, but he was surprised to hear the subject seriously treated. We have amalgams on the market that will last as long as copper amalgam, and do not have the terrible color it has. His knowledge of it does not show that it fills any place not already occupied by better material.

Dr. Russell thought Dr. Weatherbee too positive in his assertion. We have in this country at least ten thousand dentists, and of these there are at least one thousand good dentists who use copper amalgam. It has been proved too often for anyone to say there is no good in it. Copper amalgam is known to succeed in teeth when all other fillings fail.

Dr. Rhein said it was not to be wondered at that the gentleman from Boston should have taken such a serious view of the question, for we all have seen the bad results following the indiscriminate use of this material. He was pleased with the moderate stand of the essayist, who did not recommend its universal use. In certain cavities in the buccal surfaces of the third molars, and in posterior and buccal surfaces of the second molars which are very difficult of access and almost impossible of preparation so that they will retain any other filling, copper amalgam will remain without the amount of anchorage which would be needed with any other filling. In certain other positions where its use seems to be indicated it fails, especially where it approaches the cervical border of the gum. The essayist says it is never decomposed except in an acid mouth, but he had seen cases of failure in mouths where there was never an acid reaction, though tested frequently. There was one such case especially in which a large copper amalgam filling in the course of a few months disappeared so rapidly that he removed the remainder for fear of the result the copper might have on the system.

Dr. Niles said that copper and mercury mixed to form an amalgam only in definite proportions, and the failures reported probably resulted from the use of too much or too little mercury in the amalgam. A superior grade of copper amalgam can be made by observing the exact proportions of the metals used, and the best results can only be obtained by very exact methods. Copper amalgam has its place, and is invaluable in its place. There is no shrinkage or change of shape in a copper amalgam filling ; the union between the amalgam and the dentine is as perfect after three or four years as it is the day it is inserted ; and there is no acid in the mouth capable of dissolving a filling made of a good copper amalgam.

Dr. C. N. Peirce said he thought Dr. Weatherbee had been too strong in his denunciation of copper amalgam. It was not the blackest filling,—not so black as the old silver amalgam. He would be sorry to do away with it, as it is a remarkably good filling for frail structures. He used it in third molars and deciduous molars, and generally in the teeth of children, where the filling will not be seen. Sometimes he puts gold foil over it, and does not think this will interfere with the durability of the filling. He also uses sponge gold in connection with copper amalgam, and makes a better filling than he could with gold alone.

Dr. Rhein said that he had used gold foil over ordinary amalgams with good success, but found that with copper amalgam it caused a destructive absorption of the filling. The black color seems to be its protective armor. Copper amalgam is a very irritating filling in certain cavities. In a large number of cavities where he would not hesitate to put in any other filling he found it very irritating. He commended its use only in shallow fillings, to guard against the danger of its being dissolved and producing systemic trouble.

Dr. A. J. Parker, of Bellows Falls, Vt., read a paper on

Copper Pulp-Caps,

of which the following is an abstract:

The essayist said that in his search for a pulp-capping that should possess the qualities of a non-conductor, an unyielding protector, and that should cause no irritation, he had adopted a concave cap of copper, varying in size to meet the indications. Such a cap, if properly adjusted, came nearest to his ideal of what a pulp-cap should be than anything else he had ever used. The method he employed is as follows: After thoroughly cleansing the cavity he wiped it out with eucalyptol and cotton to disinfect, and then with oil of cloves to soothe the pulp. Then, selecting a cap of proper size, he dips it into a thick solution of sandarac, which makes it adhere to the place where it is applied. He then mixes a paste of oxide of zinc and oil of cloves, which he works down around the edges and over the cap, which makes it non-conducting. He makes the caps by rolling down a strip of copper or copper wire to the thickness of thick writing-paper, and with a hollow punch, the copper strip being laid on a block of lead, strikes up the cap, which takes the concave shape of the punch. He had been using this method for about a year, and the results had been entirely satisfactory.

Afternoon Session.

The convention was called to order at 3 o'clock, President C. W. Clements in the chair.

Dr. G. F. Cheney, of St. Johnsbury, Vt., read a paper entitled

Pulp Protection by Cavity Lining.

Dr. Cheney considered that in a very large proportion of the cases in which abscess sooner or later followed the insertion of metallic fillings in teeth where there was no actual exposure of the pulp, the trouble might have been averted by protection of the pulp by pulp-cavity lining. This is especially true in approximal cavities of lateral incisors and bicuspids, where the pulps come so near the surface. In all cases where there is the slightest chance for the pulp to be injured by thermal influences, the safest course is to guard the pulp by lining the cavity with a non-conductor. We should always bear in mind the larger proportional size of the pulp in early life; the possibility of its occupying an abnormal position; the probability of cracks or fissures extending to it, and the liability of a point of the pulp coming nearly to the surface. It is important to diagnose the difference between sensitiveness of the dentine and near exposure of the pulp. The former responds when excavating over a considerable portion of the cavity walls, but does not respond to simple pressure; the latter responds as readily to pressure as to the excavator, and the sensitiveness is confined to a point. Of the various materials which he had tried, he considered sandarac gum dissolved in alcohol, and used quite thin, the most efficient. It leaves upon the cavity walls a thin, semi-opaque film, which is non-conducting, non-irritating, insoluble, and more in harmony with dentine than any metallic substance. It can be used in any cavity, no matter how shallow, because of the small amount of space it occupies. His practice is to dip a small pellet of cotton in the varnish and apply it to the bottom and walls of the cavity, which had previously been thoroughly dried, allowing five or ten minutes for the hardening, hastening it if desired by hot air. He sometimes dips a piece of tissue-paper in the varnish and places it over the cavity bottom.

In approximal cavities of posterior teeth, especially those extending below the gum-margin, and in close proximity to the pulp, with barely depth enough for anchorage, he has found nothing so suitable for lining as varnish.

In deep-seated cavities, where undercuts exist, if the enamel is strong, it need not be cut away if oxyphosphate of zinc cement is well packed as a support, which is almost equivalent to dentine. A cavity can be cut in the cement to a depth a little greater than the enamel, thus reducing the operation of filling with gold to a very simple matter. Such a cavity has then a hard, firm base of cement, and a boundary of cement and tooth-substance, or of the latter alone. When oxyphosphate is used in deep-seated cavities, the pulp may be protected from the effect of phosphoric acid by using first a little oxysulphate of zinc or a pad of oxide of zinc and oil of cloves. Oxysulphate of zinc is one of the best pulp-protectors, easy of adaptation, non-irritating alike to sensitive dentine and to the dental pulp. When the pulp is nearly exposed, place a small amount of thinly-mixed oxysulphate over the bottom of the cavity, allowing a few minutes for it to set, and finishing the lining by covering it with oxyphosphate of zinc. Oxychloride of zinc, when used in bulk, shrinks notably, and is therefore not reliable as a lining except when used in small quantity. It should not be used near the pulp, except over varnish or oxyphosphate. He had not used gutta-percha much, and would be afraid to use a heavy lining of it for fear of expansion. He instanced a case in which he had filled an approximal cavity in a bicuspid with amalgam. The patient complained of the action of cold air or water, and he remedied the trouble by drilling a small cavity in the crown and filling it with gold in such a manner that the gold came in contact with both the dentine and the amalgam filling. He had subsequently treated similar cases in the same manner with equally good results. The theory was that an electric current was thus set up. From these experiences he deduced the conclusion that combination fillings of gold and tin, or gold and amalgam, should be classed among the pulp-protectors.

Discussion.

Dr. D. M. Clapp said that the ideas of the essayist agreed very nearly with his own. Many think that oxyphosphate will destroy pulps, but he had not found it did in his practice. He thoroughly believed in varnishing cavities, and varnishes a large proportion of all the cavities he fills, irrespective of the character of the filling to be inserted. In gutta-percha fillings it seems especially advisable, as the varnish holds the filling tight to the walls of the cavity. According to his judgment, no cavity is injured by having a coat of varnish. He treats cavities so even when the filling is to be gold, and varnishes them quite to the edge, and he has not found that any evil results follow.

Dr. Cheney said that he never allowed the varnish to come to the edge of the cavity, as it was not necessary for the purpose of protection.

Dr. Clapp thought that in cases of nearly exposed pulp a piece of bibulous paper saturated with varnish in the bottom of the cavity afforded the best protection.

Dr. G. F. Waters. Theoretically no material should be used for protection of the pulp which will suffer a change of density after it is put in place, for a contraction might cause pressure upon the pulp. He related an experience of more than forty years ago. Filling some molars in which the cavity extended so deep that points of the pulps were exposed, he had placed over the bottom of the cavities mats made of several thicknesses of tin foil, and had filled the cavities with tin. Some time afterward, at the desire of the patient, he removed these fillings for the purpose of replacing them with gold, and found there had been an exudation of lime-salts which had formed a natural covering for the pulps, and which he described as being clear as honey and almost as hard as enamel. The texture of the filling was clearly shown on the surface of this new deposit, proving that the deposit had been made in the fluid state, and that the pulp had thus protected itself.

(To be continued.)

NEW JERSEY EXAMINATIONS.

THE New Jersey Dental Commission will hold its next meeting for examinations in Orange, N. J., on Tuesday, January 20, 1891.

Persons intending to begin the practice of dentistry in New Jersey must make application to the secretary of the board previous to January 6, 1891.

G. CARLETON BROWN, *Secretary*,
Elizabeth, N. J.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF CALIFORNIA—COLLEGE OF DENTISTRY.

THE annual commencement exercises of the College of Dentistry of the University of California were held at Odd Fellows' Hall, San Francisco, on Thursday evening, November 13, 1890.

The address on behalf of the faculty was delivered by Professor C. L. Goddard, A.M., D.D.S.

The number of matriculates for the session was thirty-three.

The degree of D.D.S. was conferred on the following graduates by Martin Kellogg, A.M., president *pro tem.* of the university :

NAME.	STATE.	NAME.	STATE.
Frederick H. Allbright	California.	Walter R. Lovegrove	California.
Gotthard S. Backman	Sweden.	George Martin	California.
Frank D. Burleson	California.	Richard McCarger	California.
Paul C. Erhardt	California.	John M. Redmond	California.
William T. Heider	California.	David W. Rulison	Nevada.
Charles A. Herrick	California.	William F. Sharp	California.
Saul R. Jacobs	California.	Albert J. Sylvester	California.
Charles A. Litton	California.	Clark H. Rawson	NewYork.

EDITORIAL.

THE RUDIMENTS OF DENTISTRY.

A DENTAL practitioner, introducing to the writer an office student who was about to matriculate at a dental college, remarked that the young man had acquired the rudiments of dentistry under his preceptorship, and was now ready to enter college. A little conversation with the intending matriculant revealed the fact that his idea of what constituted the rudiments of his proposed future calling was a knowledge of the elementary mechanical manipulations of the laboratory and office. Of anatomy, histology, physiology, and pathology he knew nothing, and yet considered himself well along in the attainment of the necessary qualifications for the practice of dentistry, and, worse still, his preceptor seemed to indulge the same opinion.

It would be interesting and instructive to learn what proportion of the immense number in attendance at the dental colleges of the country are imbued with like ideas of what constitutes fitness for dental practice ; how many accept the enforced attendance at college simply because it is a prerequisite by reason of legal enactment, and for attainment of the doctorate so earnestly desired.

It would also be a valuable contribution to current knowledge could we learn what proportion of those who will graduate at the ensuing commencements will enter upon practice having reasonable familiarity with the rudiments of their calling.

What, then, are the rudiments of dentistry,—the "first principles" of the science? If with any propriety it is to be classed as a branch of the healing art (whether practiced as a distinct profession or as a specialty of medicine matters not,—the difference is that of name merely), its intelligent pursuit has a basis in common with medicine. A competency to treat intelligently any part of the animal economy presupposes a knowledge of the anatomical structure of the part, the relations to surrounding parts, the nervous, arterial, and venous connections, the recognition of pathological conditions, and the philosophy of therapeutics,—in short, the dentist should comprehend the anatomy, histology, physiology, and pathology of every tissue of the mouth, the causes of aberration, and the means and methods of restoring abnormal to healthy conditions. How else can it be expected that he should appreciate the nature of the changes in structure and function which are called disease, or the conditions which hinder or promote normal processes? If pathology means perverted nutrition, and if dental lesions are expressions of such perversions, the consideration of their cause and treatment, whether local or constitutional, expresses the medical aspect of the practice. To know *what* to do is the duty of the apprentice ; to know *why* is the privilege of the expert. To know what will give relief in a diseased condition is the *art;* to know *why* is the science. Can such appreciative knowledge be acquired except by an understanding of organic functions,—of respiration, circulation, digestion, assimilation, secretion, sensation, and motion? How else can inflammation and its consequences be apprehended and combated? And without such knowledge how dare anyone administer an anesthetic?

This is the sort of knowledge—not the details of mechanical manipulation—which constitutes the rudiments, the institutes, the basal principles of medicine and dentistry alike.

Specialism is the inevitable outcome of the extension of medical art and science, and the notable advances made by specialists have compelled both popular and professional recognition. It is acknowledged on all hands that it is utterly impossible for any one man to master medical and surgical practice in all of their details. Specialists, however, command respect as such only by unquestioned special qualification, and a limitation to a specialty without assured special qualification invites no such recognition as is otherwise freely accorded.

The variety and importance of oral lesions are not open to question, nor is there danger that any man may bring to the practice of dentistry talent or skill for which he will not find fitting opportunity.

THE RELATION OF ENVIRONMENT TO RACE TYPES.

WE should have been glad, if space permitted, to publish a full abstract of a series of interesting papers in the Baltimore *Sun*, by Professor Bloomfield, of Johns Hopkins University, regarding the effect of environment on the different races of mankind. Professor Bloomfield contends that the influence of climate and of all other similar causes is insufficient to effect appreciable changes in race types through thousands of years. He claims that the negro is to-day precisely what he was so long ago as the founding of Thebes, and that the same is true of the white, brown, and red races. He affirms that so far as historic time presents the evidence, there is no proof of any change having been produced in these types except by the intermingling of races. He regards the notion of a gradual change of the Caucasian type in America as purely fanciful.

PYOKTANIN.

THIS new antiseptic is the current craze, and, as usual with new things in medicine and surgery, extravagant claims are made for it. As one of the marvelous multitude of hydro-carbon compounds it is especially interesting in its relation to the phenol series, some of which are notable antiseptics. Pyoktanin is but another name for aniline free from arsenic or other impurity. The antiseptic properties of blue and yellow aniline are said to have been known and used by medical men in this country since 1882, but a German physician, Prof. I. Stilling, of Strasburg University, has lately called general attention to it as a "pus-killer," and for the time being it is a surgical fad.

There are two principal varieties, the blue and the yellow, employed either in powder or in solution. Staining effects are inseparable from the use of either color, but the yellow is said to be much less disfiguring than the blue. In the DENTAL COSMOS for December, Dr. W. H. Atkinson is reported as having spoken before the First District Dental Society in strong terms as to its value in dentistry. Experimenters, however, are already making adverse reports, and it will be safe to await the results of further experimentation before deciding upon its title to pre-eminence as a general antiseptic.

In one of the Mutter lectures recently delivered at the College of Physicians of Philadelphia, the lecturer, Dr. Roswell Park, expressed a decidedly unfavorable opinion as to the antiseptic properties of pyoktanin. Dr. Park based his statements upon an elaborate series of experiments, conducted upon what is thought to be the most accurate system of testing antiseptic values, and made by him during last summer in Koch's laboratory in Berlin. Such evidence is deserving of the most careful consideration.

A COMPLIMENTARY DINNER TO THE PIONEERS OF DENTISTRY.

We have received, through the courtesy of Dr. Rodrigues Ottolengui, the secretary of the meeting, a report of the action taken in response to the suggestion of a complimentary dinner to be tendered to certain of the pioneers of dentistry still living. It was voted that the banquet be given in the latter part of January, 1891. It is proposed to make the occasion a memorable one, and it is confidently expected that between two and three hundred of the most prominent dentists throughout the country will sit at this feast in honor of the guests of the evening. The societies represented are the Central of New Jersey, the Odontological, the First and Second District, and the Brooklyn. An executive committee was chosen, with Dr. Kingsley as chairman, Dr. Northrop as treasurer, and Dr. Ottolengui as secretary, and a member from each of the societies represented.

It is fitting that such recognition be given to the men who by their energy in the earlier history of dentistry notably contributed to its advancement to the position which it holds to-day. The necrology of the last decade bears sad witness to the fact that the ranks of the pioneers of dentistry are being rapidly lessened, and it will be a pleasant memory that advantage was taken of an opportunity to pay those who remain a deserved honor.

THE WORLD'S COLUMBIAN DENTAL MEETING.

We give the prominence of editorial space to the initial circular of the Executive Committee of the great meeting which it is proposed to hold at Chicago in 1893. The enterprise, having the sanction of the American and the Southern Dental Associations, in both of which the vote approving it was passed without a dissenting voice, bids fair to be a grand success. It is to be earnestly hoped that no discordant elements may be allowed to interfere with the earnest and steady preparation which the magnitude and importance of the occasion demands. It needs only harmonious co-operation on the part of the dentists of the United States to insure a meeting which shall accomplish more permanent good results for dentistry than any previous event in its history.

TO THE PRACTITIONERS OF DENTISTRY THROUGHOUT THE WORLD.

The Southern and the American Dental Associations, at their respective annual meetings held during the past summer, by *unanimous* vote of each body declared in favor of utilizing the great occasion of the World's Columbian Exposition, to be held in Chicago in 1893, by organizing a world's meeting of the practitioners of dentistry, to be held August 31 to September 10, 1893.

In pursuance of this resolution, a committee of five from each body was appointed, and the joint committee so created was authorized to add five more to its membership, thus constituting an Executive Committee clothed with full power to take such action as in its judgment it should deem best to carry out the objects of its organization, such action to be final and binding.

This Executive Committee is composed as follows:

Appointed by the Southern Dental Association.

Drs. L. D. Carpenter, Atlanta, Ga.; J. Y. Crawford, Nashville, Tenn.; W. J. Barton, Paris, Texas; J. Taft, Cincinnati, Ohio; C. S. Stockton, Newark, N. J.

Appointed by the American Dental Association.

Drs. L. D. Shepard, Boston, Mass.; W. W. Walker, New York City; A. O. Hunt, Iowa City, Iowa; H. B. Noble, Washington, D. C.; George W. McElhaney, Columbus, Ga.

Elected by the Joint Committee.

Drs. J. C. Storey, Dallas, Texas; M. W. Foster, Baltimore, Md.; A. W. Harlan, Chicago, Ill.; J. S. Marshall, Chicago, Ill.; H. J. McKellops, St. Louis, Mo.

The Executive Committee has elected the following as its officers: President, W. W. Walker; Secretary, A. O. Hunt; Treasurer, J. S. Marshall. It has also adopted a constitution for its government, and decided upon the future organization of the following committees: on finance, on programme, on exhibits, on transportation, on reception, on registration, on printing, on conference with State and local societies, on dental legislation in this and other countries, an auditing committee, a committee on invitation, on membership, on educational and literary exhibit, on clinics in operative dentistry and oral surgery, and on prosthetic dentistry.

The objects had in view by the two great representative bodies authorizing and inaugurating the movement for the holding of THE WORLD'S COLUMBIAN DENTAL MEETING are thus broadly and tersely set forth by the Executive Committee:

"The bringing together for professional, scientific, and social purposes the dentists of the United States and of all other countries."

It is the desire, as it will be the effort, of the Executive Committee to so justify the trust reposed in it that the contemplated meeting shall prove a brilliant and long-to-be-remembered success. It stands pledged to do whatever may be in its power to make the occasion contribute notably to the elevation of the profession, to stimulate the spirit of research, to strengthen fraternal courtesy, and to promote cordial co-operation among all who desire the advancement of dental science and art. The aim would be too limited if it included less than this, and the enterprise will be a failure if it fall short of a realization of this ambition.

For the accomplishment of these objects the hearty assistance of every college faculty, of every State and local society, and of every reputable dental practitioner, is earnestly solicited.

All practicing dentists outside of the United States are cordially invited to participate in the meeting, without contributory cost; and there is reason to believe that the invitation will be accepted by large numbers of foreign dentists.

We desire and expect the presence of distinguished representative dentists from almost every civilized country, and nearly all of note in our own country, resulting in the largest gathering of dental practitioners in the history of the world.

Information as to the progress of the work will be communicated through the journals from time to time, and meanwhile every dentist is urged to do all in his power to forward the objects sought.

In behalf of the Executive Committee,

W. W. Walker, *President*,
67 W. Ninth St., New York City.

AVAILABLE DENTAL INFORMATION.

The December number of the Dental Cosmos for 1890 carried an index to the volume containing three thousand three hundred and thirty-seven references to contributors, titles, and subjects—all dental—which had appeared during the year. The dentist, the student, and the teacher will there find alphabetical reference to the thing, the work, or the individual sought for. Such a topical index is the special accomplishment of the Dental Cosmos, and is unparalleled in periodical literature.

The latest professional knowledge is thus made readily available to the English-reading dentist at an outlay trivial in comparison with its daily practical value.

The Subject Index and the Bibliography of Dental Literature accompanying each number, supplemented by an index of this character, seem to leave nothing in these directions to be desired.

DENTAL NECROLOGY OF THE LAST DECADE.

We have collated the names and date of death, from the published notices, of three hundred and sixty-four men more or less prominent in dentistry or holding close relations with it. Some of these were just entering practice, and some were known by long service to the civilized world. The list includes the names of all of whom we have knowledge who have deceased since the publication of the necrology of the previous decade in the DENTAL COSMOS for August, 1880. The compilation has been made for convenience of reference.

	DATE OF DEATH.
Charles Abbey	Dec. 28, 1881.
Frank P. Abbot	Oct. 11, 1886.
Richard M. Adair	July 21, 1885.
Wm. M. Adamson	April 2, 1888.
J. W. Allen	——, 1889.
William G. Allen	July 8, 1889.
William H. Allen	Oct. 23, 1882.
J. N. Alphin	July 29, 1888.
J. G Ambler	April 6, 1885.
Levi G. Anderson	Jan. 6, 1886.
Prof. E. Andrieu	May 14, 1889.
James M. Arnott	May 27, 1884.
James H. Ashmead	Dec. 2, 1880.
Thomas Ashton	Jan. 31, 1887.
Clinton Atkinson	May 31, 1890.
Wm. Audley	July 18, 1884.
J. F. Austin	——, 1888.
John Austin	April 10, 1890.
John C. Austin	Oct. 23, 1881.
J. L. Baker	Nov. 18, 1889.
Wm. H. Bange	June 4, 1882.
Joseph C. Barnum	April 18, 1890.
S. C. Barnum	Dec. 24, 1885.
Henry Barron	Jan., 1883.
Edw. B. Bartlett	——, 1881.
Charles Spence Bate	July 29, 1889.
Fred. W. Bate	Dec. 30, 1885.
John W. Baxter	July 19, 1887..
H. A. Beamer	July 25, 1890.
John A. Beard	Mar. 20, 1888.
Geo. Beavis	Nov. 6, 1887.
E. A. Becht	Feb. 7, 1886.
John B. Belisario	Feb. 11, 1887.
Lynn Berhard	April 20, 1884.
Archibald Berry	Oct. 2, 1889.
A. H. Best	Dec. 27, 1885.
J. H. Bidford	Nov. 11, 1885.
Geo. M. Bobbett.	Aug. 15, 1885.
Charles Bonsall	July 8, 1890.
Horace A. Bowers	Dec. 8, 1889.
E. Brasseur	Jan. 25, 1889.
W. K. Bridgman	Dec. 27, 1883.
C. H. Bromley	May 4, 1890.
William A. Bronson	Aug. 20, 1890.
J. M. Brown	May 27, 1886.
J. K. Bryant	Feb. 14, 1889.
Geo. Buchanan	Oct. 2, 1885.
Thos. L. Buckingham	Sept. 4, 1883.
Latham L. Buckland	Aug. 3, 1887.
Maria A. Burch	Dec. 13, 1888.
Joseph L. Burger	June 30, 1881.
J. W. Cabaniss	——, 1885.
T. R. Cameron	Aug. 19, 1888.
W. H. Cameron	June, 1886.
W. A. Candee	July 26, 1883.
Alfred G. Canton	Oct. 30, 1882.
Jacob Carr	——, 1890.
Alex. C. Castle	Aug. 31, 1880.
Wm. A. N. Cattlin	Dec. 13, 1886.
James Chandler	April 17, 1882.
Wm. S. Chandler	July 18, 1884.
Clinton Chatfield	Sept. 3, 1883.
C. S. Chittenden	May 8, 1889.
S. T. Clements	Aug. 31, 1887.
Thos. Clements	——, 1882.
William Clendenin	May 3, 1885.
Jas. Thomas Clover	Sept. 27, 1882.
Wm. A. Clymer	April 24, 1890.
Frank H. Coburn	April 15, 1882.
Lansing B. Cook	Feb. 27, 1881.
T. L. Cook	——, 1889.
Geo. C. Cooper	May 8, 1886.
Wm. A. Cornelius	Mar. 4, 1883.
O. S. Covert	March, 1889.
I. W. Cox	Jan. 25, 1881.
Byron F. Coy	July 20, 1881.
Henry Coy	Sept. 2, 1881.
Miguel V. Crespo	Sept. 22, 1884.
Frederick Crocker	Nov. 19, 1882.
Evlyn E. Crofoot	April, 1889.
W. W. Cross	Oct. 30, 1886.
John M. Crowell	Mar. 13, 1888.
M. S. Dean	Jan. 28, 1882.
Joseph Deschauer	Oct. 21, 1890.
J. H. Devore	Aug. 3, 1887.
John Q. Dickerman	Mar. 11, 1889.
Alexander Dienst	May, 1883.
Charles F. Dinger	Mar. 29, 1889.
Elliot L. Douglass	Feb. 5, 1889.
Jonathan Douthett	Apr. 16, 1886.
Milton J. Downer	Feb. 11, 1889.
Stoddard Driggs	July 18, 1888.
J. C. Duell	Jan. 29, 1881.
W. B. Dunlap	Jan. 18, 1890.
William Dutch	Oct. 24, 1887.
C. H. Dyer	Dec. 27, 1889.
M. E. Eagan	Mar. 9, 1885.
Robert Early	Dec. 29, 1883.
Wm. C. Eastlack	Feb. 26, 1887.
James M. Easton	Feb. 21, 1887.
Frank Ebbets	——, 1882.
Wm. F. Edington	Jan. 27, 1883.
F. S. Eggert	——, 1889.
J. G. Emery	Nov. 16, 1888.
Nathaniel Emmons	June 30, 1889.
R. L. Evans	Sept. 3, 1889.
Jean Evrard	May 28, 1882.
Wm. Prescott Farrar	Oct. 12, 1888.
Fiske Fay	July 16, 1889.
Matthew Finlayson	Jan. 8, 1889.
William Fishbough	May 21, 1881.
Chauncy P. Fitch	May 19, 1888.

	DATE OF DEATH.
Isaiah Forbes	July 15, 1885.
Arthur C. Ford	Dec. 20, 1883.
Hamilton Forrest	Nov. 6, 1887.
Charles B. Foster	Sept. 22, 1882.
Wm. W. Fouché	Nov. 13, 1890.
James S. Franklin	Jan. 12, 1888.
Alexander Frazer	Sept. 16, 1890.
Samuel D. French	July 21, 1889.
Thomas Fry	Aug. 4, 1883.
Emil B. Gardette	June 17, 1888.
J. Carlos Gardiner	Nov. 19, 1883.
Gustavus A. Gerry	Oct. 24, 1890
David Gillies	Jan., 1888.
Wm. H. Goddard	Mar. 4, 1883.
David S. Goldey	Jan. 14, 1884.
Hugh M. Grant	Dec. 19, 1887.
Samuel E. Greene	Feb. 6, 1889.
Clark L. Gregory	Oct. 9, 1885.
Samuel D. Gross	May 6, 1884.
T. B. Gunning	Jan. 8, 1889.
R. B. Gwathmey	Nov., 1884.
Edward Hale, Jr.	May 20, 1886.
T. Hall	June 18, 1887.
Albert Hape	Oct. 5, 1884.
W. F. Harbaugh	Jan. 29, 1881.
B. L. Harding	——, 1890.
Geo. H. Harding	Mar. 3, 1888.
J. Hardman	May 22, 1890.
Irby Hardy	Feb. 1, 1886.
Joseph S. Hartman	Nov. 7, 1881.
Daniel Harwood	Oct. 2, 1881.
D. C. Hawxhurst	Feb. 16, 1882.
George E. Hayes	April 27, 1882.
Richmond S. Hayes	Jan. 31, 1890.
James A. Herman	Feb. 19, 1883.
Wm. H. Herriott	Nov. 4, 1884.
Alfred Hill	Apr. 18, 1890.
Walter C. Hogan	——, 1883.
Robert Hogue	April 1, 1889.
J. P. Holmes	Sept. 2, 1885.
J. T. Holmes	July 31, 1880.
George A. Horting	Nov. 1, 1882.
Thos. Howkins	Mar. 29, 1885.
William A. Huber	Feb. 25, 1889.
Jefferson D. Hulen	Nov. 8, 1889.
William M. Hunter	Nov. 25, 1889.
W. A. Jackson	Apr. 14, 1884.
John Jamieson	April 30, 1886.
O. A. Jarvis	Sept. 27, 1884.
R. V. Jenks	March, 1888.
W. H. Jewitt	Apr. 17, 1889.
M. S. Jobson	Mar. 24, 1886.
Amos Johnson	Dec. 10, 1882.
Stephen R. Jordan	Nov. 18, 1882.
Homer Judd	May 20, 1890.
Henry H. Keech	April 3, 1884
George W. Keely	Aug. 24, 1888.
James W. Kekwick	Jan. 23, 1884.
Henry T. K. Kempton	Sept. 28, 1886.
M. W. S. Kendall	——, 1882.
Horatio G. Kern	May 9, 1889.
Norman King	Dec. 25, 1880.
W. T. King	Dec. 7, 1889.

	DATE OF DEATH.
P. J. Kinnaman	Feb. 19, 1889.
Uriah B. Kirk	Jan. 9, 1890.
Fred. H. Knapp	June 23, 1883.
Isaac Knapp	May 9, 1883.
C. C. Knowles	Dec. 17, 1888.
M. D. La Croix	——, 1890.
W. A. Lafary	Mar. 13, 1888.
John W. Langmore	May, 1889.
Edward G. Leslie	April 20, 1888.
Charles de Lessert	June, 1886.
Morris Levett	——, 1884.
C. W. Lewis	Oct. 21, 1890.
E. H. Lewis	Jan. 25, 1889.
Frank G. Lewis	July 31, 1887.
W. K. Lineaweaver	May 13, 1888.
J. W. Locke	——, 1884.
M. L. Logan	Mar. 9, 1885.
W. H. Long	Dec. 15, 1883.
E. B. Loud	——, 1890.
Isidore Lyons	——, 1886.
J. G. McAuley	June 6, 1884.
S. H. McCall	Dec. 10, 1882.
John McCalla	July 28, 1887.
S. A. McCampbell	Dec. 16, 1882.
R. L. McClellan	Feb. 5, 1889.
Milton McCoy	Sept. 22, 1886.
Robert McCracken	Mar. 26, 1888.
Geo. B. McDonald	Oct. 8, 1884.
S. A. McDowell	Jan. 3, 1887.
J. L. McGee	Nov. 4, 1885.
Donald D. Magill	Nov. 15, 1889.
John B. Magor	Aug. 31, 1886.
W. T. Mahon	Feb. 10, 1888.
Thos. Mahonie	Oct. 1, 1886.
James H. Mann	Nov. 3, 1882.
William Margetson	Jan. 29, 1885.
C. C. Marshall	——, 1885.
Samuel E. Marshall	Sept. 11, 1890.
C. F. Martin	Aug. 21, 1881.
S. G. Martin	Dec. 9, 1885.
B. T. Mason	Sept. 3, 1890.
L. P. Meredith	——, 1884.
James Merryweather	Jan. 11, 1888.
James C. Miller	June 6, 1883.
Thos. D. Miller	Aug. 19, 1884.
W. E. Mitchell	June 30, 1883.
H. E. Moore	Jan. 2, 1890.
W. V. Moore	Sept. 4, 1888.
John C. Morison	Jan., 1881.
J. B. Morrison	Dec., 1888.
J. F. Moulton	May 20, 1888.
J. R. Mummery	Jan. 6, 1888.
Charles M. Murphy	April 30, 1888.
Wm. D. Napier	June, 1881.
Samuel W. Neall	Mar. 29, 1884.
J. W. Nelson	——, 1885.
Wm. A. Newland	July 24, 1885.
Wm. J. Newman	Nov., 1887.
Henry B. Noble	April 19, 1889.
Wm. H. Nolan	Sept. 13, 1887.
Frederick Normansell	July 3, 1881.
Nicholas N. Noyes	Mar. 22, 1888.
E. M. Nutting	July 3, 1882.

	DATE OF DEATH.
M. M. Oldham	Oct. 27, 1883.
Edmond Osmond	Nov. 24, 1886.
J. J. P. Ostrader	Nov. 21, 1888.
G. S. Palmer	Oct. 15, 1888.
Siegmund Pappenheim	Aug. 29, 1880.
David M. Parker	Oct. 8, 1887.
Geo. Parkinson	Apr. 28, 1890.
Samuel W. Parmly	Dec. 15, 1880.
Wm. M. Parson	Dec., 1884.
Elisha Parsons	Aug. 21, 1889.
T. S. Pearsall	Mar. 28, 1888.
Wm. A. Pease	Nov. 29, 1889.
José M. Perez	Mar. 7, 1888.
David W. Perkins	Aug. 18, 1884.
James S. Perkins	Dec. 1, 1886.
Jared A. Perkins	Feb. 4, 1881.
William Perry	Jan. 11, 1887.
Amos A. Pevey	March, 1889.
Henry Picton	May 19, 1889.
C. B. Porter	Mar. 20, 1889.
J. P. Porter	Oct. 4, 1887.
Robert Pratt	Oct. 10, 1881.
Adolph P. Preterre	Mar. 20, 1886.
J. H. Prewitt	Dec. 31, 1887.
E. E. Prothro	——, 1886.
Samuel M. Prothro	——, 1885.
Ralph C. Purnell	July 26, 1887.
G. W. Ratzberg	——, 1890.
W. G. Redman	Nov. 11, 1885.
F. H. Rehwinkel	June 8, 1889.
Fred. A. Reinhart	Aug. 6, 1883.
J. S. Reynolds	Sept. 11, 1887.
Nelson Reynolds	Nov. 28, 1883.
Wm. Reynolds	——, 1881.
Leon Rideout	May 14, 1889.
John M. Riggs	Nov. 11, 1885.
William E. Riggs	——, 1882.
R. L. Robbins	Dec. 29, 1885.
John Roberts	Jan. 1, 1887.
Walter B. Roberts	July 30, 1889.
D. A. Robertson	——, 1883.
Alfred Rogers	Apr. 12, 1884.
S. Rogers	Sept. 20, 1881.
Charles Rose	Feb. 12, 1887.
Wm. Routledge	May 18, 1885.
Enos G. Roy	May 20, 1881.
John R. Rubencame	Aug. 17, 1889.
Robert R. Russell	Dec., 1888.
John H. Samuel	——, 1885.
Peter W. Samuel	Nov. 14, 1881.
John W. Scarborough	——, 1888.
Flavius Searle	Feb. 10, 1889.
E. F. Semple	Feb. 27, 1886.
Isaac Sheffield	June, 1881.
Thos. Sheffield	Oct. 13, 1884.
James Shepard	Dec., 1885.
Joaquin Silva	Nov. 1, 1880.
George Sleep	May 4, 1890.
J. E. Sligel	June 30, 1888.
George Smillie	Dec. 29, 1880.
J. W. Smith	June 6, 1889.
Otis Stanfield	April 4, 1885.
Charles W. Stearns	Sept. 8, 1888.

	DATE OF DEATH.
Chas. S. Stent	July 17, 1885.
John Stephan	June 25, 1890.
J. C. Stephens	Sept. 6, 1880.
Robt. E. Stewart	May 19, 1886.
Philo L. Stoddard	April, 1888.
John Storrar	April, 1886.
J. L. Suesserott	July 16, 1886.
James M. Surgisson	May 25, 1881.
J. S. Swartley	Aug. 18, 1884.
Geo. J. Sylvester	Apr. 30, 1888.
Calvin Reed Taft	June 15, 1889.
A. S. Talbert	Dec., 1883.
James Taylor	June 12, 1881.
T. C. Tierney	July 5, 1883.
Hiram Todd	Aug. 22, 1884.
James Tracy	Sept. 2, 1888.
Joshua Tucker	Nov. 7, 1881.
R. F. Tull	April 6, 1885.
W. A. Turner	May 18, 1890.
L. E. Uhrich	Jan. 4, 1883.
Joel P. Ulrey	Nov. 9, 1886.
B. F. Van Boskirk	Mar. 21, 1890.
Edward Vanderslice	May 7, 1883.
H. J. Virgin	Oct. 20, 1881.
Arthur B. Visick	Apr. 12, 1886.
Edward E. Wade	Nov. 6, 1889.
J. R. Walker	June 22, 1887.
Ellerslie Wallace	——, 1885.
W. T. Wallace	June 4, 1880.
Thomas Wardle	Dec. 5, 1887.
Edward P. Warren	Jan., 1881.
Aaron Washington	Dec. 19, 1886.
John G. Wayt	Feb. 17, 1887.
Marshall H. Webb	Jan. 1, 1883.
Wm. R. Webster	Jan. 14, 1881.
L. B. Welch	April 18, 1890.
Seth P. Welch	Oct. 23, 1890.
Warren Welch	May 28, 1883.
Lyman Wells	Nov. 26, 1884.
James West	April 24, 1890.
Albert Westlake	Mar. 10, 1890.
S. H. Wheeler	Jan. 18, 1883.
J. G. Whyte	Apr. 22, 1888.
David F. Wilcox	Sept. 3, 1884.
Fred. G. Wilkes	Sept. 4, 1882.
Edwin Williams	Dec. 22, 1883.
Israel Williams	Aug. 13, 1887.
S. C. Wilson	June 27, 1881.
Wm. Wilson	June 12, 1890.
John D. Wingate	Aug. 19, 1889.
H. H. Winn	Feb. 8, 1890.
Edwin J. Winterbottom	Oct. 22, 1888.
Andrew Wood	Jan. 25, 1881.
John Wood	Sept. 13, 1887.
W. R. Wood	Apr. 30, 1890.
Wm. H. Woodhouse	Aug. 18, 1890.
Wm. H. Woodward	Sept. 8, 1890.
Albert L. Wright	Oct. 2, 1886.
Alfred Wright	Sept. 25, 1885.
Horace H. Young	Sept. 1, 1889.
J. M. Young	July 15, 1888.
Richard W. Zierlein	June 4, 1888.
Adolph Zsigmondy	Jan., 1881.

BIBLIOGRAPHICAL.

A Treatise on the Irregularities of the Teeth and their Correction: Including, with the Author's Practice, other Current Methods. Designed for Practitioners and Students. Illustrated with nearly 2000 Engravings (not embracing those in the third volume). By John Nutting Farrar, M.D., D.D.S., graduate of Jefferson Medical College and of the Pennsylvania College of Dental Surgery, member of the New York County Medical Society, etc. Volume I, royal octavo, 758 pp. New York City, 1888. Price, full cloth, with gilt back and top, $6.00; cloth sides and morocco back, with gilt back and top, $7.00; full sheep or half morocco, with gilt back and top, $8.00.

We have here, in royal octavo, on exquisite paper, in admirable type, in well-leaded pages with generous margins, a magnificent specimen of book-making. The quoted title-page gives the object and scope of the effort; the volume before us being the first of the three announced as constituting the completed work.

The topics in Volume I are discussed under fourteen heads or "parts," and in seventy chapters, and a summary of the subjects of the two succeeding volumes is included in the table of contents of the present volume under fourteen additional "parts."

The "philosophy of the author's system" is elaborately explained, occupying sixty-three pages. The illustrations in the present volume number seven hundred and three, leaving about thirteen hundred to be included in volumes two and three. If any possible device for the correction of irregularities is not described and illustrated in this work, it must be because the author has failed to have heard of it.

Three such formidable volumes on "Irregularities" are well calculated to impress the dental student with the magnitude of the problems involved in the correction of dental aberrations.

The task of inventing, collecting, and describing these multifarious devices must have been an onerous one, but the author seems to have fairly reveled in their production, presentation, and description.

In the event of a second edition being called for, we imagine that the author will be inclined to compress the three volumes into one, which could be accomplished by a judicious condensation.

Descriptive Anatomy of the Human Teeth. By G. V. Black, M.D., D.D.S. Illustrated. Octavo, 153 pp. and index. Philadelphia: The Wilmington Dental Manufacturing Co., 1890. Price, cloth, $2.50.

We congratulate the profession that at last dentistry is dignified by the production of a distinctly dental descriptive anatomy. Such a work has been long needed. The book before us gives evidence of careful and conscientious effort and the expenditure of much labor in the critical examination of a great number of teeth. The illustrations are ample, definite, minutely discriminating, and, with the carefully phrased descriptions, convey to the mind of the student or observant practitioner fresh and instructive ideas of the breadth of the dental field and the opportunity it affords for strictly scientific investigation. The author has endeavored to present a systematized nomenclature of the several parts of the teeth in detail, with such description as will call the student's attention successively to every part of each tooth, and in many ways sought to make more definite descriptive phraseology as applied to the teeth. Hints are scattered throughout the work with regard to the practical bearing of anatomical points in operative procedures, and as well careful directions for the proper dissection of the several classes of teeth.

We cordially commend this work to the consideration of teachers and students alike, in fact to every one who is really interested in acquiring or teaching a professional knowledge of the human teeth.

DENTAL SURGERY: Including Special Anatomy and Pathology. A Manual for Students and Practitioners. By HENRY SEWILL, M.R.C.S., L.D.S. Eng., past President of the Odontological Society of Great Britain, etc. Third edition, with 206 illustrations. 12mo, 400 pp. Philadelphia: P. Blakiston, Son & Co., 1890. Price, cloth, $3.00.

Previous editions of this manual have been noticed in our pages as they appeared. In the present edition the original design and scope of the work have been extended to include a concise consideration of almost every subject included in the practice of operative dentistry. Considerable space is given to the discussion of caries, its prevention and treatment; to exposure and diseases of the pulp and of the dental periosteum. As a compendium of information upon the several subjects discussed, the book is an excellent sample of its class, though, like all compends, it does not permit of the fullness of treatment which each topic would demand in a more pretentious work.

PROGRESSIVE EXERCISES IN PRACTICAL CHEMISTRY. By HENRY LEFFMANN, M.D., Ph.D., Professor of Chemistry in the Woman's Medical College of Pennsylvania, etc., and WILLIAM BEAM, M.A., Demonstrator of Chemistry in the Pennsylvania College of Dental Surgery, etc. Illustrated, 12mo, 102 pp. and index. Philadelphia: P. Blakiston, Son & Co., 1890. Price, cloth, $1.00.

This work commends itself as a valuable aid in acquiring a knowledge of the groundwork of chemistry, by furnishing systematic instruction, in clear and simple language, as to the various manipulations required in making a graded series of characteristic tests and properly observing and recording the results obtained. As a guide to an intelligently planned and illustrative laboratory course in the rudiments of chemistry, it sufficiently fulfills the requirements within its scope.

THE LATIN GRAMMAR OF PHARMACY AND MEDICINE. By D. H. ROBINSON, Ph.D., Professor of Latin Language and Literature, University of Kansas. With an Introduction by L. E. Sayre, Ph.G., Professor of Pharmacy in and Dean of Department of Pharmacy, University of Kansas. Large 12mo, 271 pp. Philadelphia: P. Blakiston, Son & Co., 1890. Price, cloth, $2.00.

This book is designed to meet the needs of first-year pharmacy and medical students,—especially of those who have not studied Latin. The author's aim was to make it as practical for such students as the philosophical unfolding of the principles of Latin grammar would permit. For those who have not the opportunity for a thorough study of Latin this book must prove valuable in supplying the special knowledge required in pharmacy and medicine.

A COMPEND OF HUMAN ANATOMY, including the Anatomy of the Viscera. By SAMUEL O. L. POTTER, M.A., M.D., Professor of Theory and Practice of Medicine in the Cooper Medical College of San Francisco, etc. Fifth edition, revised and enlarged, with 117 wood engravings; also an Appendix containing numerous Tables and 16 lithographic plates of the Nerves and Arteries. 12mo, 300 pp. and index. Philadelphia: P. Blakiston, Son & Co., 1890. Price, cloth, $1.00; interleaved for taking notes, $1.25.

Two former volumes—"Human Anatomy" and "Visceral Anatomy"—are here combined. The author writes that in his endeavor to improve the book and keep it in the front rank among works of its class he has added an appendix containing an original and complete set of tables and plates of the arteries, the cranial and spinal nerves and plexuses, and the sympathetic nervous system. He is quite right in assuming that as a work of reference this volume will prove of great value to the student in college and the physician in practice.

THE EVOLUTION OF IMMORTALITY: or Suggestions of an Individual Immortality Based Upon our Organic and Life History. By C. T. STOCKWELL. Third edition, with Appendix. Chicago: Charles H. Kerr & Co., 1890.

The physical phenomena of being along the whole line of life, from protoplasm to man, have practical relations to the study of the morphology and morbidity of any part of the human subject. All medical men are therefore interested in the fundamental inquiries of the author into the nature of life. His position is that progression in the development of observable life implies progress on the part of man into a life not now observable, since otherwise man would be an exception to the rule that every form of life is the predicate of a higher type.

An appendix to this edition makes the positions of the author clearer and stronger.

Space for notice of this volume is here accorded because of the fact that its writer is a practitioner of dentistry.

THE MEDICAL BULLETIN VISITING LIST, or Physician's Call Record. Arranged upon an original and convenient monthly and weekly plan for the daily Recording of Professional Visits. New edition. Philadelphia and London: F. A. Davis, 1891. Prices, $1.25, $1.50, and $1.75.

Twenty-four pages of preliminary matter include various tables, formulæ, emergency notes, etc. This visiting list embraces a new feature in the form of half leaves, enabling the practitioner to keep a record of visit, charge, credit, etc., for the month, without rewriting the patient's name.

THE PHYSICIAN'S ALL-REQUISITE TIME AND LABOR-SAVING ACCOUNT BOOK. Designed by WILLIAM A. SEIBERT, of Easton, Pa. Philadelphia and London: F. A. Davis. Price, 300 pp., $5.00; 600 pp., $8.00.

The publisher claims that by this plan the labor of keeping accounts is reduced more than one-half, and that at the same time the greatest degree of accuracy is secured. The book measures ten by twelve inches, on good paper and in substantial binding, and can be used for any year or any time of year.

OBITUARY.

DR. SETH P. WELCH.

DIED, at Lansingburg, N. Y., October 23, 1890, Dr. SETH P. WELCH, in the sixty-seventh year of his age.

Dr. Welch was born at Schuylersville, N. Y., September 8, 1824. He was a competent and successful practitioner of dentistry at Lansingburg for many years, and was a member of several dental societies. He was a man of high character, and secured in a remarkable degree the confidence and esteem of all with whom he associated.

PUBLISHER'S NOTICE.

THE NEW VOLUME.

It is surely unnecessary that we should use any argument to persuade those who have been subscribers to the Dental Cosmos to renew their subscriptions for the new volume. If any practitioner of dentistry who has received and read the Cosmos for a year can deliberately decide that he can afford to do without it, it is not worth while to waste words upon him. But those who have recently entered the profession and all who have not enjoyed its monthly visits heretofore, are earnestly commended to make the trial of a year's subscription.

We call attention to our constant illustration of whatever is easier or better understood thereby, to the Monthly Bibliography of Dental Literature, to the Topical Index accompanying each number, and to the General Index at the close of the volume, as features which add to the value of the journal. Of the general character of the reading-matter it is not necessary to speak.

TO SUBSCRIBERS.

We have an earnest word to say to subscribers to the Dental Cosmos. Not infrequently we receive letters showing that the writers have taken to heart as a personal affront our failure to continue serving the journal after the expiration of their subscription. But there are only two ways of managing a subscription list,—to continue sending the periodical until forbid, or to discontinue unless otherwise ordered. Either plan proves unsatisfactory in practice in some cases, but we adopted the latter many years since as least open to objection and complaint. We prefer not to assume that anyone desires a continuance without specific notice to that effect, and therefore beg our friends to send in their names as early as convenient.

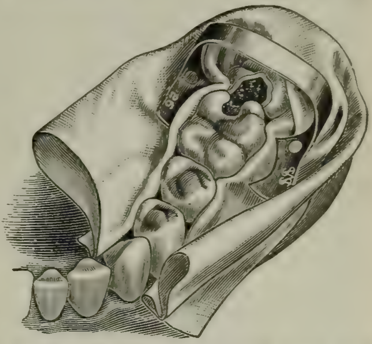
Subscription, $2.50 a year in advance.

Postage free to all subscribers in the United States, Canada, and Mexico. Foreign postage to Universal Postal Union countries, 50 cents.

The S. S. White Dental Mfg. Co.

HINTS AND QUERIES.

To Keep Cavities Dry.—Not infrequently does it occur in practice that cavities in the lower teeth are to be examined or treated expeditiously when the application of the rubber-dam would consume more than the available time. Yet it is very desirable that in such cases the cavities should be made quite dry, and kept so long enough to allow either thorough examination, preliminary excavation, temporary filling, applications for devitalization to be tightly sealed in, or the introduction of medicaments into pulpless canals. For these and similar purposes the expedient of pinning pieces of spunk, bibulous paper, or the folded end of a napkin against the sides of the teeth by means of a rubber-dam clamp, as shown in the illustration, will be found to be both effective and time-saving.—W. S. H.



Gold Inlays.—[Dr. J. A. Swasey having been requested to impart his method of inlaying in detail, gives the following description of the process. —Editor Dental Cosmos.]

Regarding the question of inlays, it has been and is now my custom to prepare the cavity as for a gold filling, having the edges rounded, and, if an approximal cavity, obtain plenty of space between the teeth by previous separation with cotton or rubber. If there are any undercuts, I fill them with wax, so as to allow me to take an impression with modelling compound, using a small tin cup which I make, covering one or two teeth. If the cavity is properly formed, a perfect impression can readily be obtained.

Then I get a plaster model; from that an impression in moldine, and with Melotte's metal poured in it I get a sharp die; then swedge up pure gold of about 50-gauge, trim the overhanging edges of the gold, then place the gold in the cavity, and if the impression and die are accurate, the result is an inlay that fits perfectly. If, however, there is a slight discrepancy, or to make it doubly sure, I use a piece of as soft erasing rubber as I can procure, or a block of pure rubber, placing it over the inlay while in tooth, asking the patient to close his mouth. Of course, the gold should be annealed occasionally during the operation.

Then I remove carefully and immerse in hard-coal ashes and plaster, being careful that it does not run over the edge of the inlay. After it becomes hard, I then proceed to fuse into the inlay twenty-carat gold in small pieces, using a large flame, with which I have better success than with a small one, continuing until the cavity is even full; then, if I wish any portion of the inlay contoured I add more of these pieces, using a very small flame and fusing only the portion I wish to contour. Then I cut a groove to receive the cement, and finish in the same manner as in gold filling. If possible, I never finish until the next day, as the work sometimes destroys the cement, therefore it is safer to delay finishing for twenty-four hours.

VENT FILLINGS.—Exigencies in practice sometimes require the adoption of methods not consonant with what would be esteemed the correct modes if time or other circumstances would permit. For example, a patient will, within a few hours, take train or steamer, to be absent several months. A lower molar has, by the patient's neglect, become pulpless. In such a case it has been the practice of the writer to properly prepare the cavity for filling, as, for instance, in Fig. 1. From a box of common cooking gelatine select or cut a strip like A, Fig. 2; slightly warm it, and bend it into the bow-shape of B, Fig. 2. Insert the end of one such bow in the distal and put another bow in the mesial root-canals, as shown in Fig. 3. Out of the larger pieces of gelatine bows may be cut to suit the operator's purpose in any given case. It is, of course, assumed that proper preparation means drying as well as shaping the cavity, being careful to keep from the root-canals anything that would obstruct them. The cavity is then filled with cement or amalgam, taking care not to displace the gelatine bows from the canals. So soon as the filling becomes hard enough to allow the admission of saliva, the gelatine will quickly soften so that the filling on that side may be finished flush, and the edges of the prospective openings be very slightly smoothed with a suitable round bur. The completed filling, as in the present instance, will appear as represented in Fig. 4, wherein B, B indicate the vent openings.

FIG. 1.

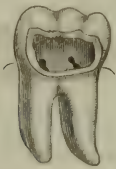


FIG. 2.

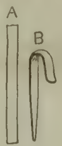


FIG. 3.

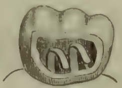


FIG. 4.

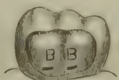
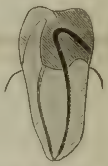


FIG. 5.



The patient may be at once dismissed, and the dentist be confident that in a few hours the gelatine plugs will have been completely dissolved, and the root-canals have free vents through the sinuses thus made, as is clearly shown by the section through the crown, filling, and mesial root represented by Fig. 5. It is remarkable that by this simple method the artificial sinus may be given a flattened or a curved form, and have its entire course through the filling, thus avoiding any danger of decay by contact of the outflow with the crown or with the root, as in the Hullihen operation. Another noteworthy advantage is that in whatever tooth a vent may be thus provided, the discharge can be directed downward, so that the opening will not be liable to become choked by the gravitation of food débris. The opening may, moreover, be located at any desired point on the face of any filling. There is also a certainty that the internal mouth of the artificial sinus will open directly into the canal.

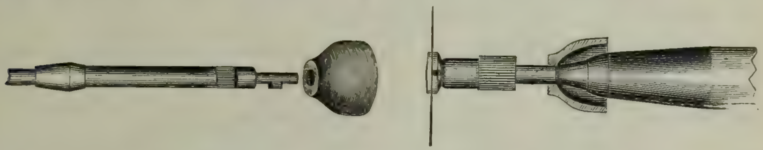
By the described method all the risks and uncertainties of ordinary rhizodontrypy are avoided, and the positive advantages before mentioned obtained.

In cases of this kind the patient should always be plainly told that the operation is but an expedient for the temporary preservation of the tooth, which is at the first opportunity to be subjected to painless treatment and the roots and crown permanently filled. The precise nature of the temporary filling should in every case be so carefully explained that the patient will be able to exactly describe it to the dentist who may be called upon to complete the operation. —W. S. H.

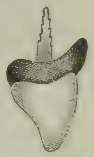
To Control Occlusion.—The difficulty in this operation is to obtain a natural articulation. Our text-books give us no end of rules: "Drop the patient's head as far back as possible;" "Tell him to swallow;" "Tell him to touch his back teeth;" "Don't tell him to bite back, or he will surely bite forward," etc.

My plan is as follows: For instance, in a full upper case I place the trial-plate and wax rim in the mouth ready for the imprint of the inferior teeth, then I simply place the tip of my forefinger at the front of the wax rim about where the lower teeth will touch, and ask the patient to close his mouth slowly. When the inferior teeth touch my finger I make the request, "Don't bite my finger, but bite back of it." At once, if he has bitten forward, the jaw jumps back like a machine. As the teeth approach the wax I gradually manipulate out my finger. I have tried this plan in over thirty cases with entire success. —Harold Clark, Toronto.

Hand-Piece Protector.—In the use of mandrels carrying abrading materials, especially when wet powders are employed, the gritty substances are apt to work along the shank and into the nose of the hand-piece, which thereby becomes worn out of true. To avoid this injury and also to keep out the saliva when using burs on lower teeth not inclosed by the rubber-dam, I slip over the bur or mandrel shank one of the small (No. 1) rubber cups used for polishing purposes, and find it to perfectly protect the hand-piece, as is made apparent by the illustrations.—J. D. Ennis, Norfolk, Va.



Porcelain Tooth-Crown with Gum.—Fit a platinum collar and cap to the root-end and perforate the cap to allow a platinum post to be pushed through into the root and project a little from the cap. Select a pinless, plate, rubber, or other porcelain crown; fit, articulate, and wax it to the cap and post, and remove for vertical investment in just enough plaster and marble-dust or asbestos to hold the parts together. When set, remove the wax and fill with porcelain body, dry thoroughly, and biscuit about three minutes in a Parker-Stoddard furnace. So soon as cool enough to handle, carefully cut the investment away from the crown and the cap, add body to fill the cracks, and fuse in the furnace. If the gum has receded from about the neck of the root, gum-enamel can be modeled over the collar, and the final firing (with but one investment) will produce a very artistic restoration of both crown and gum, to be mounted with cement as usual.—W. M. Sharpe, Sussex, N. B., Canada.



Median-Line Fracture of Plates.—I have had a discouraging experience with a patient for whom three vulcanite plates were successively constructed, and who returned in a short time showing a fracture of the plates between the upper centrals. The second and third plates were reinforced with heavy gold wire imbedded in the vulcanite, but these did not prevent an early return of the plates fractured as in the first instance. I am at a loss what next to do, and will be thankful for information.—H. T. N.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

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ORIGINAL COMMUNICATIONS.

THE MANAGEMENT OF ENAMEL MARGINS.

BY G. V. BLACK, M.D., D.D.S., JACKSONVILLE, ILL.

(Continued from page 14.)

WEAK LINES OF THE ENAMEL.

IN the human teeth the enamel is peculiarly weak on certain lines. These are so placed that the strength is sufficient so long as the enamel is otherwise entire; but when there is a break in some part of the enamel adjoining these lines, making filling necessary, it is important that we do not leave some small portion of enamel between the margin of the cavity and one of these lines, because of the greater liability to breakage. These lines are represented by the developmental grooves of the crowns of the teeth. They are the lines in which fissures and other developmental faults of like nature oftenest occur.

In order to understand these lines of weakness it is best to turn for a few moments to the development of the teeth, and study certain features of the plan upon which the enamel is formed. In this I must suppose the reader to have obtained some familiarity with the main features of the development of the teeth; for it is not my purpose to describe these processes in detail in this series of papers.

In the development of the teeth the enamel-organ and the dentine-organ—the pulp of the future tooth—are developed contemporaneously, and they gradually assume some portions of the form of the crown of the future tooth. They do not assume the complete form. The complete form of the enamel and dentine-cap, or grinding-surface of the tooth, is never fully laid down until it is formed in hard tissue, dentine and enamel. First of all, portions of the dentine-pulp, closely covered by the forming enamel-organ, are formed into points which represent the cusps of the tooth. Upon these points, if the cusps are to be of even height, dentine begins to form contemporaneously; but if of uneven height, the formation of dentine is begun on the longest first. At this time the cells which form the enamel (ameloblasts) are just coming to maturity at this immediate point; and at once enamel begins to be laid down upon the film of formed dentine. From this time forward, until the completion of the enamel, dentine and enamel are being formed contemporaneously; the formation of dentine spreading slightly in advance of the formation of enamel. In this process there will be as many separate plates of enamel forming as there are points of beginning. There are four points of beginning for the incisors, cuspids, and bicuspids, and three to five for the molars according to the number of the cusps. In some teeth certain of these, which are much lower than the others, become blended by the extension of the plates first begun to the point of usual second beginning before calcification has been effected at the lower point. Therefore two or three plates may be formed in one, in individual instances, though they usually begin separately. This occurs especially with the linguo-gingival ridge, or lingual lobe, of the lower incisors and cuspids; and also less often the cusps of the bicuspids are joined with the angles at the highest part of the buccal marginal ridge (leading from the point of the cusp to the angles) and upon the buccal surface, leaving a groove toward the central part of the occluding surface only.

When these plates have begun to form, the dentine-pulp has not attained the size or form of the crown of the tooth; nor does the enamel-organ show the form of the enamel-cap. All parts are changing by interstitial growth except those portions of the plates formed of hard tissue, which grow by accretion only. These plates are much closer together than the cusps of the completed tooth. As the forming plates enlarge they are carried farther apart by the growth of the dentine-pulp until the size of the crown of the tooth has been attained and the enamel-organ is extended to cover it. Then the margins of the plates coalesce, forming the cap of the crown of the tooth, both dentine and enamel. Afterward they grow in thickness only, the dentine from without inward, and the enamel from within outward, while extension proceeds in the formation of the length of the crown.

In this process the dentine-forming cells (odontoblasts) mature only as they are needed for the formation of the dentine. As the plates forming extend, they approach each other margin to margin as the size of the dentine-cap is attained, and finally fuse together. Then growth of dentine proceeds from without inward (with extension to form the length of the tooth), and there is rarely a failure of perfect junction of the dentine-plates. Occasionally, however, this occurs on the lingual surface of the incisors, especially the upper lateral, making an ugly linguo-gingival fissure extending into the cementum ; and there is generally a groove extending into the dentine in the line of the lingual groove of the upper first molars. The plates of perfected enamel-forming cells (ameloblasts) also come together with the completion of the enamel-cap. But in this case the direction of growth is from within outward, and instead of the crowding of the cells into smaller space, as in the forming of the dentine, the opposite holds ; the formed cells are spread over a greater area. Now, in case of any failure of the powers of development, the margins of the enamel-plates fall short at those points where the reach from the place of beginning is the longest, and fail of perfect fusion. This results in pits and fissures in the central parts of the occluding surfaces of the molars and bicuspids and in the lingual surfaces of the incisors ; also more rarely across the cutting-edges of the incisors, between the buccal cusps and angles of the bicuspids, and between the cusps of the molars. Furthermore, there seems to be evidence that there is frequently a want of concordance in the growth of the dentine and enamel in such a way that the dentine becomes too large for the enamel-cap, the latter being pulled apart where its margins should join. At least it is a matter of observation that large teeth with prominent cusps are often badly fissured, though otherwise well developed. In the best developed teeth a slight groove or fine line, visible to the naked eye in unworn teeth, remains along the lines of junction of the enamel-plates, which I have termed the developmental grooves, or developmental lines. These vary in depth, when the lines are nominally well closed, from a very perceptible line to one so slight as to be obliterated by a few months of wear. In teeth of markedly faulty development the failure of the fusion of the enamel-plates along some portion of these lines is a constant feature.

The formation of the enamel-cap is similar to the formation of the plates or bones of the skull. These proceed from certain centers of ossification, and the skull is completed by the joining of the plates by suture. It occasionally happens, also, that these are incomplete, or are completed only at an abnormally late period, at the points of longest reach from the centers of beginning. The form of junction, however, is different in the two cases.

A perfect junction or fusion of the enamel-plates is common in certain parts of the developmental lines. That is, after a little wear has removed the exterior mark of junction its place cannot be found by the naked eye ; and if the tissue be prepared for microscopic examination no deviation from the regular form of the tissue-elements marks the line of junction. Notwithstanding this seeming perfection, much experience in the observation of these lines in practice, and in the preparation of them for microscopic study (grinding sections), has shown clearly that even these seemingly perfect junctions are weaker, and break more readily, than other parts of the enamel. In practice the observation may have overlooked grave imperfections not visible to the naked eye ; and in grinding sections a break often occurs before the section is sufficiently thin for certain forms of imperfect junction to be made out with the microscope. For these reasons the study of these imperfections has been difficult.

The open fissure of the enamel at the junctions of the enamel-plates is well known to every dentist. It is constantly being presented in the office, and needs but little by way of description. Its depth may be slight, say one-fourth the thickness of the enamel, or may extend through four-fifths of the thickness ; and in the worst forms the dentine is left without covering. However, there is generally a film of enamel covering the dentine at the bottom of the wide-open fissure. In this the enamel-rods are tortuous and imperfectly cemented together. It possesses but little physical strength, and is readily destroyed by corrosive agents. In many cases in which the fissure is of less extent, the condition of the enamel between its bottom and the dentine is no better. It is cloudy (dark in old teeth), grayish, or slightly opaque. The enamel-rods are intermingled in confusion, or converge to a central line of junction. The individual rods are granular, and they are imperfectly cemented together. I suppose all such fissures are cut away by every operator as far as the naked eye or the fine explorer detects the imperfection.

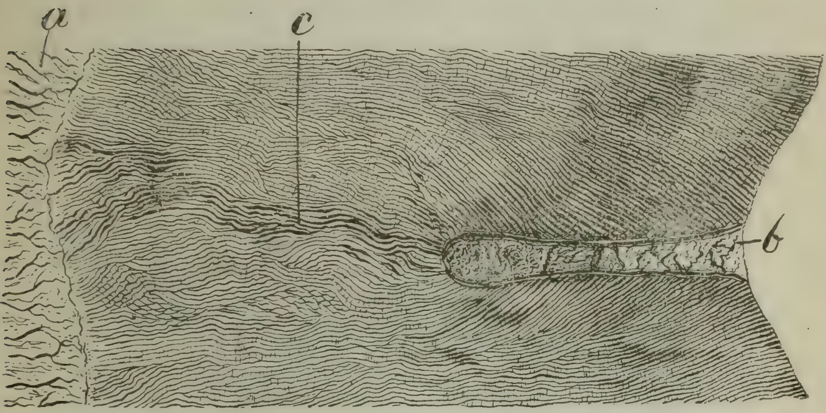
It is to those lines of junction that to the naked eye seem perfect that I wish to call more especial attention. And I do so, not because the dentist should cut farther than is now the habit of good operators when removing fissures and grooves for the purpose of filling, but because so many are depending on these weak lines to stand when a small strip of enamel is left between them and the margins of contour, or other large fillings. These lines are weak at their best, and they are often very imperfect when the naked eye will not detect the imperfection. Therefore enamel margins should not be formed contiguous to them except for the gravest reasons.

I present a series of drawings from sections of enamel cut across several developmental lines. All of them are from cases in which the naked eye examination and the use of a fine exploring instrument indicated a perfect union. Each of the slight grooves was smoothly rounded at the bottom.

Fig. 12 was drawn from a section across the buccal groove of a well-formed lower molar at the highest point of the buccal ridge.

The groove presented a smoothly-rounded bottom, and seemed to be perfect enamel. On making the section the enamel was found unusually thin on the crown generally, and the dentine shows several series of interglobular spaces. The enamel is generally well formed, is free from bands of pigmentation, and the rods are fairly regular. The grooves seemed to show perfect fusion of the enamel-plates, with the exception of a shallow pit in the center of the crown; but by microscopic examination this was found deceptive. All were deeply fissured and filled in with calcific material. The buccal groove at the point chosen for illustration shows a fissure extending through nearly half the thickness of the enamel, and filled smoothly with a calcific mass which shows no special structure. The enamel-rods converge toward this from either side, presenting their ends diagonally toward it, as they usually do toward open fissures. There seems to be no fusion of this mass with the enamel.* It is clearly a piece set in; one of nature's fillings.

FIG. 12.



Section across the buccal groove of a lower first molar on a line between the cusps. *a*, Dentine; *b*, A fissure in the enamel closed with calcific material; *c*, Imperfect structure along the line of junction of the enamel-plates.

Below this extraneous body the line of junction of the enamel-plates, shown at *c*, is very imperfect, and in this instance is full of dark lines which seem to mark imperfect cementing of the rods. The rods themselves are granular and imperfectly formed. Such a line has but little physical strength.

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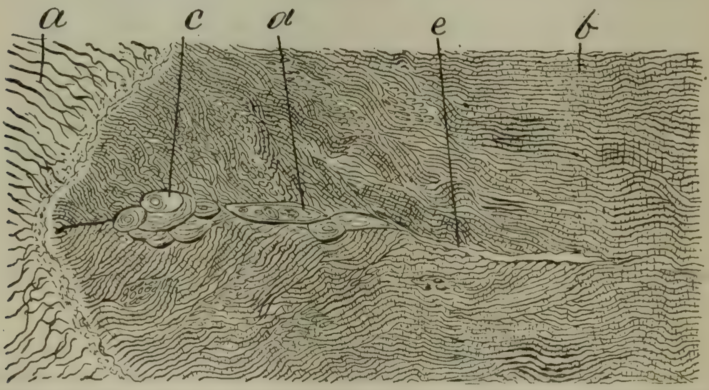
* What the nature of the material is, is not fully agreed upon by histologists. John Tomes and Charles Tomes regard it as cementum, and speak of finding lacunæ in these plugs. They regard Nasmyth's membrane as consisting of cementum, and that in such a situation the fissure is filled by it. Others have regarded it as chitinous material. When the enamel is dissolved by a weak acid, this substance retains its form, as does Nasmyth's membrane, and the two are found to be continuous with each other. Therefore it probably has a matrix of glue-giving material similar to cementum and dentine. I have never been able to make out lacunæ satisfactorily.

In Fig. 13 I present another form of imperfect fusion of the enamel-plates. In this case a first bicuspid, a young tooth well developed, with long cusps, removed to make room in a case of irregularity, was so cut as to obtain a section parallel with the enamel-rods near the summit of the buccal ridge on a line from the point of the buccal cusp to the mesial angle. The cut is across the mesial triangular groove. (See Fig. 17, *e*.) This particular portion of the bicuspid has been chosen for illustration because it is a point at which error in shaping large proximate cavities is common. This kind of fault seems not very uncommon, if I may judge from the number found in grinding about twenty sections for the purpose of examining these lines of junction. Also the number of cases met with in practice where the enamel has broken along this line of junction after moderately large proximal fillings have been made, indicate frequency of faulty junctions not appreciable by ordinary examination.

FIG. 13.



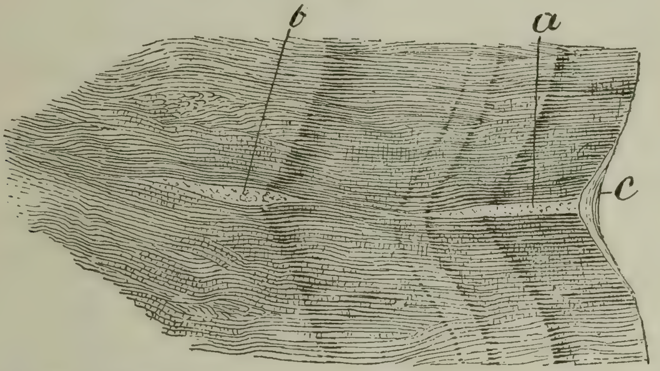
Section across the junction of the enamel-plates of an upper bicuspid cut on a line from the summit of the buccal cusp to the angle. *a*, Dentine; *b*, Enamel; *c*, Globular masses of calcific material in the line of junction of the enamel-plates; *d*, Long-shaped bodies; *e*, Hyaline material between the enamel-rods. The illustration shows only about half the thickness of the enamel. The surface half was regularly formed, and the apparent groove only a slight depression.

In this case there is no fissure. The surface half of the enamel is apparently good, and the slight groove is smooth. The fault could be detected only with the microscope. Furthermore, in grinding sections for other purposes than the examination of these lines such a fault is rarely seen, because the enamel is generally broken through them before the section is finished. It is only by extreme care that good views of the tissue along such lines can be obtained. In the case illustrated, the fault seems to consist in the insertion of hyaline material in globular or irregular masses between the enamel-rods along the lines of junction.

Fig. 14 illustrates another form of fault that I have seen less frequently than the others, but whether this is because it occurs less often or because it is less easily detected I am not prepared to say. Several of them, more or less grave, have come to light in recent investigations. The enamel-rods are spread apart along the line of junction, and the interspace filled with granular material which evidently forms a line of easy breakage. The two points of fault (*a*, *b*) reach through about one-third of the thickness of the enamel.

This particular line of investigation was undertaken for the purpose of discovering whether or not there were physical reasons for the numerous breakages observed following the lines of junction of the enamel-plates in cases where by ordinary examination the union seemed perfect. The examinations have not been sufficiently numerous to render percentages valuable, but the results obtained have shown that faults which seriously weaken the enamel along these lines are much more numerous than I had supposed, and strongly reinforce the rule which I had previously formed from observation at the chair, which is this: Whenever an enamel margin would leave a small portion of enamel between it and any one of the developmental grooves, cut to the groove, and from the margin along the line of the groove, or just beyond it.

FIG. 14.



Section through the disto-buccal groove on the buccal surface of a lower first molar. *a*, Point of junction of the enamel-plates where the rods are spread apart and the space filled with granular material; *b*, A similar fault deeper in the enamel; *c*, A thickened portion of Nasmyth's membrane covering the groove.

In these papers I cannot take the space to outline the developmental grooves of the human teeth. I have done this carefully in my work on anatomy of the teeth. Here I will only refer to certain lines upon which I have most frequently noted errors among fairly good operators. These are the disto-buccal groove of the lower first molar (Fig. 15, *h*); the triangular grooves of the bicuspids (Fig. 17, *e*, *e*); the disto-lingual groove of the upper molars (Fig. 20, *h*), and the vertical grooves across the edges of the incisors and cuspids.

I do not mention these because they are the weaker lines of junction of the enamel-plates; for, as a matter of fact, with the exception of the disto-lingual groove of the upper molars, they are among the strongest. It is largely for this reason that they are more often trusted. But the main reason for frequent error with regard to these particular grooves is that they are so often slight in appearance, and their position is such that the margins of moderately large cavities more often approach them than other lines of junction of the enamel-plates.

EXTENSION FOR PREVENTION, OR POSITION OF ENAMEL MARGINS CONSIDERED IN RELATION TO RECURRENCE OF CARIES AFTER FILLING.

When a cavity has occurred in the occluding surface of a molar, the dentist prepares for filling with the idea that the fissures in this part of the enamel have favored the occurrence of the cavity. For this reason the fissures and grooves adjoining the cavity, even though not decayed, are cut away to such a point as seems to give opportunity for a smooth, even finish of the margins of the filling. This is done as a prevention of future recurrence of decay, because such points have been observed to be more liable to caries than the smooth parts of the enamel. I think this has become a fixed principle with the large majority of operators; and a failure to do this is regarded as careless operating. The sacrifice of the tooth-substance necessary is more than justifiable,—it is required for the safety of the operation and the tooth.

But why cut away such points? However the answer may be given, the principle is *extension for prevention*, or the removal of the enamel margin by cutting from a point of greater liability to a point of lesser liability to recurrence of caries. This principle is capable of a much wider range of usefulness than obtains at present, for, if my observation is correct, its use is confined almost exclusively to the grinding-surfaces by a large majority of operators. It seems that the thought has been, extension for a smooth finish, rather than the broader principle of extension for prevention.

It may be stated as an axiom that when reasonable extension of a cavity beyond the limits of present caries will appreciably diminish the dangers of recurrence, it should be done. A large proportion of decays occur in the proximate surfaces of the teeth ; and for many years it has been noted that recurrence of decay after filling is especially liable to occur in these surfaces. A reason for this has generally been sought in some fault in the management of the enamel margins. The enamel margins about a filling should always be regarded as a weak point, and should be guarded in every possible way against the dangers of recurrence of decay. One great difficulty has been that the same rule of extension for prevention has not been applied to the proximate surfaces as has obtained in the grinding-surfaces. In this case the obvious necessity of finding a point for a smooth finish has been lacking ; for on the proximate surfaces a smooth finish can be made at any point. Therefore, only the principle of removal of caries and cutting for anchorage has obtained.

Are the proximate surfaces more liable to caries than other surfaces? If so, are not certain portions of the proximate surfaces more liable to caries than other certain portions? Certainly that portion near the proximate contact (slightly rootwise from the contact-point) is most liable to be attacked ; and the liability diminishes as we recede from that point. This is the point where lodgments of débris are most liable to be retained and undergo acid fermentation ; and just as we recede from this to regions of the surface of the tooth where lodgments are less liable to occur, decay is less frequent. Extension for prevention is extension of the enamel margin from a line of greater liability to caries to a line of lesser liability. Or, to change the phrase, it is to cut the enamel margin from lines that are not self-cleansing to lines that are self-cleansing. This is a principle of general applicability, but applies with special force to the proximate surfaces. Especially, an enamel margin being an acknowledged weak point, should not be allowed to make a proximate contact.

In order to fully utilize this principle, an extended study of the liability of different regions of the proximate surfaces to caries becomes necessary. Space will permit me to point out some of the more obvious examples only. In bell-crowned teeth with large interproximate spaces the contact point is small, and near the occluding surfaces ; hence primary decay of the enamel* is of small area.

In thick-necked teeth the contact point is much broader. The surface of the enamel is often seriously impaired for some distance laterally from the point of penetration. This broader extent of primary decay of the enamel corresponds with the greater extent of surfaces approaching each other closely. In direct statement, just as the near contact of surfaces is extended, so is the region of special liability to caries extended. In a collection of old teeth this may be shown by the extent of the area of corroded and blackened enamel about the point of penetration of small proximate cavities. In the mouths of many young people it will appear as an area of enamel, with a whitened surface that is easily scraped away. In older persons the area of injured enamel is more often dark brown. These areas show the direction of the extension of liability to caries, and if closely studied will form safe guides for extension for prevention. The same rule will apply equally to other surfaces of the teeth. I have often heard dentists speak of polishing away such areas with disks. The enamel margin should be extended by cutting so as to include them, and usually a still greater area in the same direction, by extension for prevention.

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* Miller, in his recent work "The Micro-Organisms of the Human Mouth," page 169, designates that decay of the enamel occurring from the outside as "primary," and that occurring from within outward as "secondary" caries of the enamel. I shall follow this rule.

It is true many such areas may be polished and a nice, smooth finish made ; but unless the relations of the surfaces be changed, or the conditions materially modified, an area of especial liability to recurrence of caries, as shown by the previous corrosion, has been left at the weakest point of the filling,—namely, the enamel margin. Hence the disk should never be used for polishing surfaces before the preparation of enamel margins. This statement is not intended to apply to the simple cleaning of the surface of sound enamel.

The same rule is especially applicable to the buccal surfaces. In the majority of persons these surfaces do not decay ; but in a considerable number caries in them is very serious. A study of these cases will show that a certain area of the surfaces exhibits this liability. If the decay has begun in a buccal pit and the enamel is bright and good all about it, no extension beyond that required to obtain good margins is necessary. If caries has penetrated a smooth surface, marks of corrosion are generally found about the point of penetration. The form or direction of these signs suggests and directs the extension necessary for prevention. All of them should be included within the enamel margins, and further extension made as suggested by the direction of the lines of corrosion.

It is along these lines of thought and practice, together with greater attention to the forms of the interproximate space, and of proximate contact, that the greatest improvements in filling teeth are likely to occur within the near future. A large proportion of operators have approached perfection quite closely in the manipulation of gold, or the building of fillings, from the stand-point of the handling of the filling-material. But in arriving at this they seem not to have studied sufficiently the future liabilities of their cases to caries ; particularly as to the regions of the enamel most exposed to caries, and which might be included within the area of the present filling. The form of the interproximate space, and the form of the proximate contact best calculated to prevent leakage of food into the space during mastication, have not received sufficient study. These several points require for their best solution the concentrated attention of the profession for a number of years to come. And when this has been given we will not so often hear of the patient, who has had large contour fillings made, having to "retire around the corner to remove large masses of his dinner from between his teeth," nor of so many failures of proximate fillings.

The discussion thus far, in this and the previous paper (January Cosmos), has been confined to an examination of the physical characters of enamel and position of its surface relative to its liability to caries, which render the preparation of enamel margins in certain forms and upon certain lines desirable. Before entering upon the more specific discussion of these forms and lines, we may sum them up under three cardinal rules :

1. Cut the enamel to such a point that the surface of the filling may be so formed that the enamel margin will be self-cleansing, or be protected by the gum margin.

2. Do not form an enamel margin in such a position as to leave a small portion of enamel between it and one of the developmental grooves.

3. So form the immediate margin of the enamel that it will present no short ends of enamel-rods on its outer edge, without sloping it outward so much that the filling-material will not have good edge-strength.

Lines upon which Enamel Margins should be Formed.

The discussion of the lines upon which enamel margins should be formed will include rules 1 and 2. It will readily be understood that these refer to the location of enamel margins, while rule 3 refers to the form given to the marginal edge when finished, and ready to receive the filling-material. It is impracticable to discuss any considerable number of marginal lines within the limits intended for this series of papers. For the present I will be limited to a few such cases as will illustrate both rules.

Distal cavities of the lower first molars usually have the point of initial penetration in the fifth lobe, and under the fifth or distal cusp (Fig. 16, *c*) ; or the initial point of penetration is about the termination of the distal groove (*i*) and the direction of penetration more central. In either case, if the cavity has become large, the distal lobe is usually deeply decayed, with more or less invasion of the dentine of the disto-lingual lobe (*e*). The position of the primary decay of the enamel is controlled by the position of the proximate contact, which in the great majority of cases is with the distal lobe, and confined to a small area of surface. These cavities, when considerable extension has occurred, are complicated by the proximity of the disto-buccal groove (*h*). In many cases a large part of the enamel of the posterior part of the disto-buccal lobe has been undermined, and the disto-buccal groove appears so slight or is so often obliterated by wear that there is great temptation to ignore its presence. Therefore the line of the enamel margin is placed near the line of the groove, and breakage occurs in a short time. The rule should be to place the line of the enamel margin along the line of the groove, or beyond it, cutting away the enamel of this lobe entire in the grinding-surface and over onto the buccal surface, as illustrated in Fig. 16, unless it is found to be firmly supported by sound dentine. In the case illustrated I have not found sufficient support for the filling in the dentine of the distal third of the tooth, and have therefore cut a shallow slot mesially into the central fossa. This is generally a necessary expedient when these cavities have been left to be discovered by the patient. When a close watch is kept by the dentist in charge, such mesial cutting should not often become necessary, for the cavity should be treated while there is yet sufficient dentine for anchorage in the distal third of the tooth, and without serious danger to the pulp. Then it may not be necessary to cut away so much of the distal cusp. The line of the disto-buccal groove, if it is slight, may be ignored when broadly supported by sound dentine. But in this case it would be necessary to cut away the immediate angles to the point *c* and the point *r* to remove the lines of the enamel margin away from the proximate contact to lines that will be self-cleansing, and to hold them so by con-

FIG. 15.

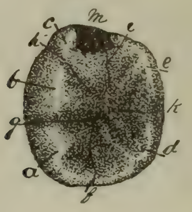

FIG. 16.

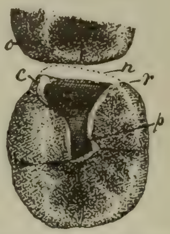

FIG. 15. Lower first molar with distal proximate cavity. *a*, Mesio-buccal cusp; *b*, Disto-buccal cusp; *c*, Distal cusp; *d*, Mesio-lingual cusp; *e*, Disto-lingual cusp; *f*, Mesial groove; *g*, Buccal groove; *h*, Disto-buccal groove; *i*, Distal groove; *k*, Lingual groove; *m*, Carious cavity.

FIG. 16. Same tooth as shown in Fig. 15, but with cavity prepared for filling. *c*, Disto-buccal, or fifth cusp, cut away; *r*, Line of enamel margin extended to the disto-lingual angle; *n*, Line of intended contour of the filling, showing the contact with the second molar *o*, and how the lines of the enamel margins are held away from near contact to render them self-cleansing; *p*, Slot cut into the central fossa for anchorage.

touring to the dotted line *n*. The extension to the lingual angle at *r* is purely for the purpose of gaining the best position for prevention of recurrence of caries. The line extends along the angle directly to the gingival border of the gum, and then with a short curve becomes continuous with the gingival enamel margin. In these cases all of the gingival enamel margin should be covered by the free margin of the gum. In the proximate space, an enamel margin that is covered by a healthy gum septum is much safer than one that is not so covered. This lesson has been strongly reinforced in late years by the behavior of the well-fitted band and cap crowns. Decay does not occur at their margins as long as they are covered by reasonably healthy gum-tissue, even though the fit is not quite close and smooth. It may be argued that the finishing of a long line of margin near the gingival line between broad molars is difficult and tiresome to both operator and patient. This is true. But it should be done. Caries does not begin at points habitually protected by a healthy gum-margin; and such a line of margin once made fairly perfect is safe so long as the gum-margin covering it is healthy. Therefore the protection of the integrity and health of the gum septum is an important point in the management of enamel margins. To this end it is of the utmost importance that the form of proximate contact be such, when the filling is completed, as not to leak food into the proximate space during mastication, and thus break down the gum septum and expose the enamel margin to the products of the fermentation of a collection of débris. For years I have been frequently removing fillings otherwise good and refilling the cavities for the sole purpose of correcting faulty proximate contact and faulty forms of the interproximate space; and the results have been so satisfactory to both myself and to my patients that I scarcely know how to sufficiently urge care in this particular duty.

In the treatment of the bicuspids the same principles apply with even greater force than in the treatment of the lower first molars, for the proximity of the triangular grooves is liable to complicate the cavities of any of their proximate surfaces. Fig. 17 is an illustration of an upper first bicuspid with rather deep grooves, and with a cavity in the mesial surface. Upon examination of this cavity it is found that nearly all of the dentine has been destroyed under the mesial marginal ridge *f*, and that there is but little dentine supporting the enamel of the mesial angle. Now this tooth comes into view in speaking, laughing, etc., therefore there are esthetic reasons for retaining the enamel of the mesial angle that cannot be thrust aside lightly. A tooth which presented a good appearance will show a large filling if this be removed. In the case of the lower first molar no such considerations become prominent. Here they are important.

It now becomes a question between safety and appearance, in which the limits of safety should be closely approached, but not overstepped. Judgment as to the strength of the angle becomes especially important. The apparent strength of the enamel is first to be considered. Excavations show it to be practically unsupported by dentine. In the illustration before us the triangular grooves *e*, *e* are plainly marked to and over the buccal ridge, and disappear on the buccal surface by becoming shallower. The chances for strength would be much better if these grooves were not so marked. An examination of the denture generally shows the developmental grooves to be deep, and that there are a number of fissures. In this mouth the junctions of the enamel-plates are not strong; therefore, in this case, the only safe course is to cut away the whole of the mesial marginal ridge, and the angle to and over the buccal ridge onto the buccal surface, as shown in Fig. 18.

FIG. 17.

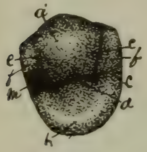

FIG. 18.

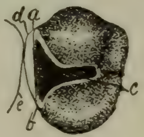

FIG. 19.

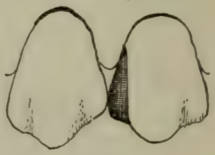

FIG. 17. Upper first bicuspid with cavity in the mesial surface. *a*, Buccal cusp; *b*, Lingual cusp; *c*, Distal groove; *d*, Central groove; *e*, *e*, Triangular grooves, mesial and distal; *f*, *f*, Marginal ridges, mesial and distal; *m*, Carious cavity.

FIG. 18. Same tooth as in Fig. 17, but with cavity prepared for filling. *a*, Mesio-buccal angle cut away to triangular groove; *b*, Mesio-lingual angle cut away to a line that will be self-cleansing; *c*, Shallow slot in the line of the central groove for anchorage; *d*, Line of contour of filling; *e*, Line of contour of the cuspid. The lines *d* and *e* show the form of proximate contact.

FIG. 19. The same teeth as in Fig. 18, after filling, in outline from the buccal surface, showing the form of contact and the interproximate space.

If, in a case otherwise similar, the developmental grooves are slight in the tooth itself, and also in the teeth of the denture generally, and if there are no fissures of the enamel, conditions showing that the junctions of the enamel-plates are well formed, the chances are much more favorable that the angle may be retained with safety. In forming this judgment, care must be taken not to be deceived by the obliteration of the grooves by wear. If, in such a case, it is proposed to retain the angle from esthetic considerations, especial care should be taken in excavating to note the amount of secondary caries of the enamel; and if it is found to be considerable, the idea should be abandoned. Caries from the inner surface of the enamel weakens it out of proportion to its seeming extent; for the reason, apparently, that the part next the dentine has more intertwining of the enamel-rods, which gives it a stronger resistance to cleavage.

In any case the cutting toward the angle should be sufficient to place the line of the enamel margin well to the buccal of the point of proximate contact, so that it will be self-cleansing. At the mesio-lingual angle esthetic considerations have no place, and the cutting should carry the line of the enamel margin so far from near approach to the neighboring tooth as to render it safe from lodgments. Upon both buccal and lingual angles the line of the enamel margins should run directly to the free margin of the gum (Fig. 19), and join the gingival enamel margin by a short curve. All of the gingival enamel margin should be covered by the gingival gum septum.

In the case illustrated (Fig. 18) a slot has been cut along the line of the central groove for the purpose of anchorage. This becomes necessary because of lack of dentine in the mesial third of the tooth in which to anchor the filling. In cases in which there is sufficient dentine this slot is not always necessary ; but in many bicuspids with thick necks and broad contact-points it is necessary to cut very wide toward the angles to remove the lines of the enamel margin sufficiently from "near approach" to render them safe against recurrence of decay. Then such a slot becomes necessary to give the filling sufficient support.

I insist that in all cases it is necessary that the greatest care should be had to preserve the form of the interproximate space, or change it to a good form if faulty, and make the proximate contact of such form as will prevent such leakage of food into the interproximate space as will injure the gum septum. If after the filling has been made it is found that the contact is so faulty as to cause injury to the gum septum by leakage of food, or if a contact good at first becomes faulty by after-movement of the teeth, the filling should be reformed for the correction of the evil. Destruction of the gum septum to and beyond the gingival margin of the filling generally means recurrence of caries at the worst point to repair.

Fig. 20 represents an upper first molar with a large decay in the distal surface and extending deeply into the crown. These cavities, when large, become difficult of management because the disto-lingual cusp *e* is so often deeply undermined, and by reason of lack of strength in the disto-lingual groove *h*. The contact-point between this tooth and the second molar is often broad, but varies much in different examples. For this reason the initial point of the penetration of the caries varies considerably, so that there is much difference in the cavities formed. Some are near the disto-buccal angle ; but the greater number are toward the disto-lingual angle, and the enamel of the disto-lingual cusp is deeply undermined. It is also in the central position of strain in mastication. In these conditions the cusp should be cut away to the line of the disto-lingual groove until the enamel is found to be supported by dentine, or so that but little enamel remains above such support. This may then be covered by filling-material and relieved from strain. The anchorage is provided for by cutting a slot mesially into the central fossa, as shown at *p*, Fig. 21. Extension for prevention is made at the disto-buccal angle, as shown at *r*. The interproximate space is preserved by building to the dotted line *m*, and the form of contact so made as to secure it against leakage of food in mastication.

FIG. 20.

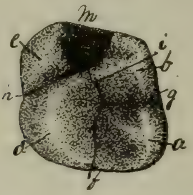

FIG. 21.

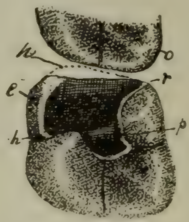

FIG. 20. Upper first molar with large distal cavity. *a*, Mesio-buccal cusp; *b*, Disto-buccal cusp; *d*, Mesio-lingual cusp; *e*, Disto-lingual cusp; *f*, Mesial groove; *g*, Buccal groove; *h*, Disto-lingual groove; *i*, Distal groove; *m*, Carious cavity.

FIG. 21. The same tooth as in Fig. 20, prepared for filling. *e*, Disto-lingual cusp cut away; *h*, Lingual groove, the disto-lingual, which terminates in the lingual at the summit of the ridge, being all removed; *m*, Line of contour of the filling, making contact with the second molar *o*; *r*, Extension of the enamel margin to the buccal angle; *p*, A shallow slot cut mesially into the central fossa for anchorage.

In cases still worse than this the disto-lingual cusp may be cut away to the line of the free margin of the gum following the lingual groove, the filling-material built out from *r*, one-third of the length of the dotted line *m*, to make proximate contact and preserve the interproximate space, and the disto-lingual cusp sloped away. In small cavities I have often been tempted to make small fillings without such extension as would carry the enamel margins clear of near approach to contact. Such fillings have been far less satisfactory than those that have been extended. For more than thirty years I have been filling teeth, and have kept a record of every filling made. It has been my constant habit to refer to that record when I found a filling going wrong; and, while I have many failures to lament in large fillings, it has been the small proximate fillings that have oftenest sickened my soul.

I have selected for the illustration of the lines upon which enamel margins should be prepared those cavities which are most complicated by difficulties. No others of similar extent are so liable to be complicated by proximity of the developmental grooves. But when they are so extended as to approach them, the same rules should apply. Extension for prevention as illustrated in these applies equally to all of the bicuspids and molars.

(To be continued.)

BACTERIOLOGY AS AN INTEGRAL PART OF THE DENTAL CURRICULUM.

BY W. D. MILLER, M.D., D.D.S., BERLIN, GERMANY.

It is now just fifty-five years since Bassi discovered the parasitic origin of muscardine, a deadly disease of the silkworm, thereby furnishing a substantial basis to the thought, which, in a vague and distorted form, had existed for two thousand years, that the origin of certain diseases of an epidemic character is to be sought for in a living something, a contagium animatum, contagium vivum.

Very little time was allowed to lapse after this discovery until the etiological connection of lower forms of life with various diseases of insects and grains was brought to light, and only twenty years later (1855) one of the most fatal diseases to which man and beast are subject, anthrax, was found to be the work of a living micro-organism, while favus, soor, and other local affections of the human body were also added to the list of diseases already proven to be of a parasitic nature.

These facts, although well supported by the masterly deductions of Henle,* were destined to meet with violent opposition on the part of many of the most prominent members of the medical profession. Men who had grown up in other beliefs, and who had spent their lives in promulgating the same, were not in a hurry to cast them aside for the new doctrine. Wise men shook their heads and smiled pityingly at what they looked upon as the aberrations of a few scientific fanatics.

This, however, could not prevent earnest workers from unearthing the truth: Rindfleisch, Waldeyer, and others from establishing the connection of micro-organisms with pyemic processes; Obermeyer from discovering the spirochæte of relapsing fever; Hansen, Friedländer, Fränkel, and Koch from bringing to light the specific producers of lepra, pneumonia, tuberculosis, and cholera, nor the many other workers in this field from accumulating great masses of evidence in favor of the doctrine of the contagium vivum, until at the present time no one would have the courage to deny the fact that the study of bacteriology has brought about a revolution in medical science within the last ten years such as has not taken place since the time of Hippocrates.

But even after this point was reluctantly admitted, and the bacteriologists had scored a most decisive victory over all opponents, a new plan of opposition was brought out: "It is all very well, for those who are interested in such things, to know that this micrococcus is the cause of one disease and that bacillus the cause of another; but what good is to be derived from such a knowledge as long as it does not help us to treat the disease more successfully?"

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* "Pathologische Untersuchungen," 1840. *Handbuch der rationellen Pathologie,* Band 2, Abtheilung 2, 1853.

This again is an objection as unwarranted as it is short-sighted, since it must be admitted by every one that to know the cause of a trouble vastly increases the possibility of discovering a cure.

Besides, Lister's antiseptic treatment, Pasteur's inoculations for anthrax and hydrophobia, direct outgrowths of the etiological work above referred to, mark an enormous advance in therapeutics, which without a knowledge of the origin of infectious diseases would never have been possible.

As for the recent discovery of Koch and the results which may grow out of it, it is at present not possible to offer a reliable opinion. Should the first hopes be realized, then this discovery is only one of a series of similar cures for all infectious diseases, and the young science of bacteriology will record a triumph in the treatment of human maladies which totally eclipses everything that has been accomplished by internal medicine during all the hundreds and thousands of years of its existence.

Should, on the other hand, the worst fears be realized, that the new cure is limited to only certain favorable cases, and that even in these the affection may return in the course of time, we should still have in it a most valuable accessory to other methods of treatment, and at the same time a means of diagnosis infinitely more sensitive than that furnished by percussion, auscultation, and other means hitherto at our disposal.

Moreover, the inspiration given to the study of bacteria in the last few weeks cannot fail to bring forth its fruits, and I am convinced that it is only a question of time when the intelligence of man shall triumph over the malignity of these lowest forms of vegetable life.

Under any and all circumstances the fact is incontrovertible that nine-tenths of the important discoveries in the domain of pathology which have been made during the last ten years must be ascribed to bacteriology, and a medical practitioner who to-day is not informed in this branch of medicine is lamentably deficient at a most vital point in his professional acquirements.

Nor can the dentist, as a member of a learned profession, as a practitioner of a specialty of medicine, or simply as an educated man, afford to be without a knowledge of those things which have done and are still doing so much to revolutionize the whole science of medicine.

Not alone for these reasons, however, but for other and more potent ones, should the study of bacteriology be made imperative upon the dental student. If we recount the various affections of the teeth and mouth that the dentist is called upon to treat, we will find that with but one exception of any importance, treatment of irregularities, they all owe their origin to the action of micro-organisms.

First of all, decay of the teeth is now, we may say, universally recognized to be a disease of parasitic origin. It is true that there are stragglers in the ranks of the profession who will come up with the main body only after the battle has been fought and won ; others who determinately set their faces against everything which does not carry the dust and cobwebs of centuries upon it, or who have not the courage to acknowledge past errors, and attempt to drown the truth by crying ''bacteria are the *result* of decay'' ; and again others who, suffering from an incapacity for anything better, simply oppose for opposition's sake. But notwithstanding these and many other obstacles, the parasitic origin of decay of the teeth has become a fact which no one can attempt to deny without subjecting his own reputation as an unbiased observer to a very severe strain.

In like manner the diseases of the pulp, resulting from its exposure through caries, its decomposition and the troubles arising from it ; pericementitis, alveolar abscess, etc., must be attributed to the same cause. In all suppurative processes of the gums, in pyorrhea alveolaris, in abscesses accompanying the impeded eruption of wisdom-teeth, bacteria, if not the primary cause, are known to have a most important influence upon the course and severity of the disease, while they are the sole agents of those intense processes of putrefaction in the mouth occurring in cases of stomatitis ulcerosa, gangrenosa, etc.

Again, there are various local diseases of the mouth (thrush, noma, stomacace, etc.) and local expressions of general diseases (tuberculosis, syphilis, diphtheria) whose parasitic nature is universally recognized.

It has furthermore been shown that serious disturbances of the alimentary tract may be brought about by constantly swallowing masses of bacteria from the mouth ; that fatal diseases of the lungs have resulted from the aspiration of germs from the oral cavity. It has also been proved that prolonged putrefactive or fermentative processes in the mouth may, through the absorption of their waste products, give rise to most serious local or general diseases, whose origin it would be absolutely impossible to detect without a proper appreciation of the factors at work in the mouth.

Finally, the number of cases of acute or chronic poisoning of the blood, septicemia, pyemia, of meningitis, etc., brought about by micro-organisms which gain entrance into the blood through wounds or through the medium of alveolar abscesses, grows almost daily.

Surely, in consideration of these facts, it is not going too far to assert that there is no branch of science or medicine of more importance to dentists than bacteriology,—no, not even anatomy itself, much less physiology, chemistry, etc. ; for how can a man better prepare himself for treating a disease than by making himself perfectly acquainted with its cause, the manner in which it operates, the conditions essential to its action, and the means by which it may be rendered harmless?

Nor has the recognition of the true cause of the great majority of the diseases of the teeth and mouth been without its beneficial influence upon their treatment. The antiseptic treatment of root-canals, of the dental pulp, of alveolar abscesses, and of pyorrhea alveolaris is certainly more intelligently carried out than when we were in the dark as to the cause of these troubles ; although the benefit which we have just begun to derive is slight compared to what we may hope to secure in the future, when the ranks of the profession shall have acquired a thorough understanding of the ways in which micro-organisms accomplish their work and the means by which they are to be combated.

Particularly in the prophylactic treatment of the teeth we have reason to hope that a thorough and general understanding of the nature of the processes going on in the human mouth and of the means available for combating them may materially extend the field of usefulness of dental science.

It is worthy of remark that whereas the last fifty years have witnessed an almost constant advance in the purely mechanical treatment of the teeth ; whereas instruments and appliances for preparing and filling cavities and for regulating teeth have been perfected in the highest degree,—no advance whatever, and, indeed, but little effort at advance, has been made in the direction of the prophylactic treatment of the teeth. It is furthermore a significant fact that the chief attempts, such as Arthur's and Bonwill's preventive treatment of decay, have also been of a purely operative nature. These facts lead us to inquire whether the mechanical aspect of dentistry has not been a little too exclusively cultivated in America. I certainly do not wish to undervalue the importance of acquiring the highest possible degree of skill in the use of the fingers, in the manipulation of filling-materials, etc., but I protest against the idea of reducing dentistry to the rank of a purely mechanical art. I believe we have a broader field of usefulness.

We ought not to forget that in spite of the high degree of perfection arrived at in filling teeth, the dentist often finds himself utterly unable to permanently arrest the ravages going on in the mouth. In addition to this, only the more favored minority of the human race can afford the luxury of a first-class dentist, so that in spite of the high state of development of the mechanical aspect of dentistry and dental art, teeth must be sacrificed yearly by the tens of millions. The question very naturally arises, Is there nothing that can be done to prevent the ravages of dental decay besides waiting till the defect has appeared, and then endeavoring to repair it by filling,—a cure which is accessible to only a minority of the human race, is painful and expensive, and too often unsuccessful? I admit that the problem is an exceedingly difficult one, but when we recall the triumphs of Lister, Pasteur, and Koch, we, as a profession, ought not to look idly on without even an attempt to accomplish similar results in our special field of labor. When the dental profession shall have given this question the attention it deserves, instead of leaving it in the hands of empirics or relegating it to a few apostles, who are expected to do the work for the entire profession, then I venture to say we may look for results which shall be of value to the profession and to humanity at large.

In conclusion, that which in my opinion should be required of the dental student in the study of bacteriology may be formulated as follows:

1. Morphology and classification of micro-organisms, particularly of bacteria.
2. The conditions under which bacteria are capable of proliferation.
3. At least a superficial idea of the methods employed for determining the presence of bacteria in liquids and in tissue, eventually of isolating and cultivating them.
4. A thorough study of the physiology and chemistry of those processes going on in media in which bacteria proliferate (fermentation, putrefaction), and the products resulting from them.
5. The methods of sterilization or the action of various medicaments and antiseptics upon bacteria, and the way in which this action is to be determined.
6. The bacteria of the human mouth and teeth; their action upon dead organic matter found in the mouth as well as upon the teeth, mucous membrane, etc., and their eventual action upon more remote parts of the body; in particular, their relation to diseases of the digestive tract and lungs and to pyemic and septicemic processes.
7. The dangers of infection accompanying operations in the human mouth, and the precautions to be taken for avoiding them.

THE DIFFERENTIATION OF ANTERIOR PROTRUSIONS OF THE UPPER MAXILLA AND TEETH.

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

(Part of paper read at the International Medical Congress, Berlin, August 4, 1890.)

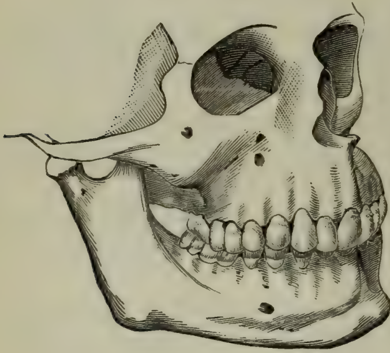
I. ANTERIOR PROTRUSIONS DUE TO CONSTITUTIONAL CAUSES.

OF the various forms of anterior protrusion that come to the notice of the practitioner, the form dating farthest back in point of time is that in which a large upper jaw is inherited.

In these cases the upper maxilla is too large for the lower, and stands out beyond it. The lower may be quite normal. When there is simply a want of proportion between the two jaws, it is due to the diminutive or excessive size of one while the other is normal. The criterion in these cases must be the facial angle. The upper jaw is usually developed in harmony with the skeleton, while the lower jaw depends for its size largely upon function, its size being the result of accident rather than design.

When the upper jaw is normal or smaller than the lower, the extent of its posterior portion is determined by the occlusion of the first permanent molar, which keeps the alveolar processes in permanent relation to each other at this point, and allows freedom of development in front. If the occlusion is not normal, the upper jaw and alveolar process will develop laterally as well as anteriorly.

FIG. 1.



The teeth of the anterior columns may either stand vertically or they may be turned in toward the lower incisors. The latter deflection is produced by the action of the lips. When the cuspids are in their normal position the upper incisors form a larger arch than the lower, and this permits of their being turned inward ; but when the cuspids have moved so far forward that they are not normally interlocked with the lower teeth, the incisors are too crowded to permit this. In the diagnosis of this form of irregularity, the following points are to be observed :

1. The straight line from the frontal eminence to the plane of the upper maxilla is nearly perpendicular, and does not cut the alveolar arch.

2. The antero-posterior diameter of the lower jaw is shorter than that of the upper.

3. The teeth of the anterior columns of the upper maxilla are either vertical or turned in toward the lower incisors.

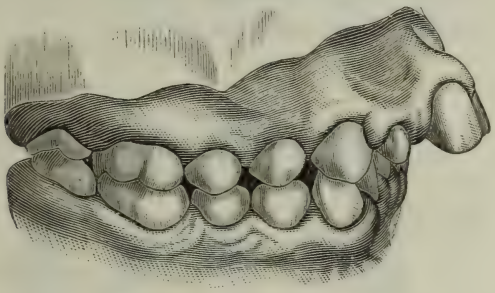
The posterior columns occlude normally.

4. Alveolar process normal. Teeth never non-divergent.
5. Bite of molars usually normal.

II. ANTERIOR PROTRUSION OF THE ALVEOLAR PROCESS AND TEETH FROM EXCESSIVE DEPOSITION OF OSTEOBLASTS.

The osseous portion of the upper maxilla in these cases is not excessively developed. The facial angle is less than normal, as the alveolar process and teeth protrude. The lower maxilla may be normal or the chin may recede. The partial eruption of the first molars makes the bite too close in these cases. Notwithstanding this, when the palatal surfaces of the upper central incisors are normal in outline, the lower incisors are prevented from sliding back against the palate by coming in contact with the basilar surfaces; but when these surfaces are not sufficiently curved, the lower incisors have a tendency to glide backward toward the palate and finally find a resting-place in the alveolar process. The irritation which results from the pressure against the mucous membrane produces excessive deposit of bone-cells in the inner plate of the alveolar process, which causes the superior central incisors to be carried forward. This irritation is intensified by the masticating process, and the incisors, being deprived of their natural function, flare out. As the central incisors begin to protrude, the laterals also become affected, and finally the cuspids. The cutting-edges of the teeth appear below the upper lip, and the lower lip is caught beneath, increasing the tendency to stand out. The more the orbicularis oris is deprived of its function, the greater the tendency of the upper teeth to project. The marked influence of the upper lip in keeping the teeth in position is shown in the case of the upper incisors, that turn inward in excessively developed upper maxillæ. From want of proper occlusion, the lower alveolar process becomes abnormally developed as the teeth are carried up against it.

FIG. 2.



The extent of the anterior movement depends upon the height of the vault, as a high vault permits a greater arc of upward movement of the lower incisors than a flat roof.

When the second molars erupt, they are prevented from doing so fully by the closeness of the bite.

The following points are to be observed in diagnosis :

1. The facial angle is less than normal.

2. The alveolar process of the upper and lower maxillæ is excessively developed.

3. The upper incisors protrude below the upper lip in cases of long standing, and are spread more or less.

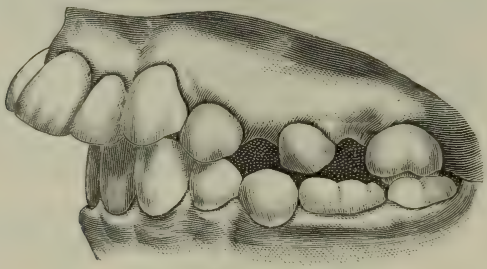
4. The lower maxilla may be normal, or the chin may recede.

5. Bite of molars too short.

III. ANTERIOR PROTRUSION FOUND IN THE V-SHAPED ARCH.

When from a want of harmony between the size of the teeth and that of the upper maxilla their combined diameters form an arch larger than that of the maxilla, the teeth are necessarily crowded, and when the cuspid erupts it pushes the anterior column forward. This leads to a flexion in the alveolar process at its weakest point, which is at or near the mesial line ; the local causes producing the same condition on the forward movement of the first molars of the upper jaw, due to the premature extraction of the deciduous teeth or the arrested growth of the ramus of the lower maxilla.

FIG. 3.



In these cases the following points should be noted :

1. The facial angle is normal or nearly so.

2. The alveolar process is normal with the exception of anterior flexion, only indicated by the crowded central incisors.

3. Lower maxilla normal, or shortened at the rami.

4. Upper incisors crowded, coming to an angle at the mesial line.

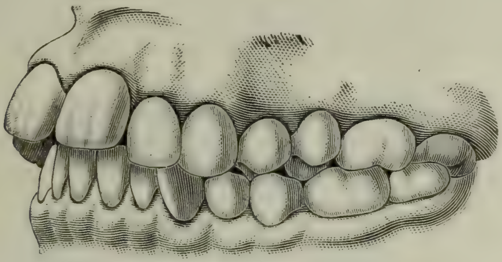
5. Bite usually more or less defective.

6. Gums usually healthy.

IV. ANTERIOR PROTRUSION DUE TO THUMB-SUCKING.

The habit of thumb-sucking manifests itself early, sometimes even during the first or second week. The location of this deformity is not uniform, as it depends upon the hand used and the habitual position of the finger or thumb. The development of the alveolar process of either jaw may be arrested, and as a consequence the character of the vault may be modified anteriorly. The teeth usually flare out fan-shaped, or one or more teeth may be pressed sideways, this tendency increasing with age. When this habit ceases early in life, the permanent teeth are usually not affected ; but when continued for years, as it is in exceptional cases, a permanent deformity results. This form of irregularity differs from the V-shaped arch by the difference in the direction of the central incisors, which in thumb-sucking *diverge*, while in the V-shaped arch they *converge*. It should be noted that the teeth affected do not occlude, owing to the cause producing the irregularity.

FIG. 4.



The points noticed in these cases are :

1. The facial angle is usually normal.
2. The alveolar process is arrested or normal.
3. The lower maxilla is not affected by this deformity.
4. The teeth are flaring or diverted to one side.
5. The bite is normal except in the region of the deformity, where it is defective.
6. The gums are not affected.

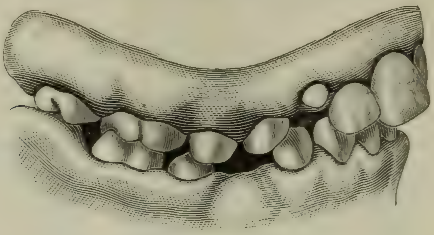
V. ANTERIOR PROTRUSION DUE TO EXTRACTION OF POSTERIOR TEETH.

When all the teeth of the upper and lower maxillæ posterior to the bicuspids are lost, in many cases a straggling arrangement and flaring out of the upper teeth occurs, while some or all of the bicuspids migrate backward. This condition has usually been ascribed to the pressure of tartar, which is by no means always present. I wish to point out the changes in occlusion that follow the loss of the posterior teeth, and to show the results that must follow from change of function and shape of the teeth.

It is generally known that where the posterior teeth are lost for some time without the introduction of an artificial denture, the lower jaw gradually approaches the upper near the angle. This is due to several causes. When the posterior teeth were in position, the force of mastication was distributed over the entire extent of the arches, keeping them nearly parallel to each other. Now the force is spent on the anterior column alone, which is forced to perform the double function of cutting and grinding. The grinding, or rather crushing, of food, now done by the incisors, introduces a new form of antero-posterior motion exerted by the cutting-edges of the lower incisors against the basilar ridge of the upper, extending pressure back, which forces the incisors forward. This tendency is increased by the form and action of the bicuspids. The two wedge-like cusps of their crowns direct the force of mastication not only downward, but forward and backward, forcing these cusps between the crowns of their antagonists, which cannot resist their action when not fortified by the crowns of adjoining molars. The bicuspids are also forced into the jaw.

When the first molars are lost, the force of the second lower molar being spent only on the mesial half of the second upper bicuspid tends to force this backward. This in time lets down the first upper bicuspid, shortening the bite more and more and forcing out the incisors. In those cases where a single third molar and one or two molars of the upper jaw remain in one side, we have a lop-sided condition noticed by all who have introduced artificial dentures in such mouths. That this anterior protrusion is noticed only in persons at or past middle age, strengthens this theory.

FIG. 5.



Points of diagnosis :

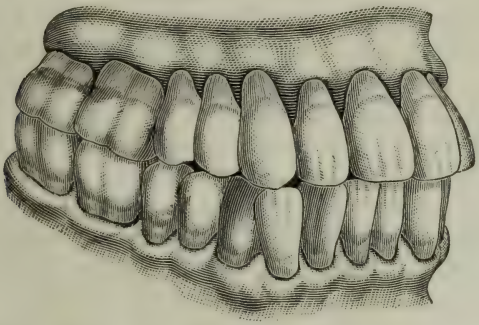
1. Facial angle normal.
2. Alveolar process normal.
3. Lower maxilla normal.

4. Upper incisors more or less protruding and diverging.
5. Bite shorter than normal.
6. Posterior teeth loose. Tartar may or may not be present.

VI. Anterior Protrusion from Riggs's Disease.

In Riggs's disease the teeth are forced out of their sockets very gradually, so that the change in the contour of the mouth takes place imperceptibly. The roots of the teeth are divided on the outside of the jaw, showing the action of the tartar from this direction. Its action in forcing the tooth out is not unlike that of an instrument inserted between a bottle and a stopper. As the teeth project from their sockets, the occlusion is impaired. The distance between the jaws when at rest being practically the same while the upper or the lower or both incisors are lengthening, the angle at which they strike each other must necessarily become more acute. In the occlusion of two normal arches we have an angle that is decidedly obtuse. Near the base of this triangle (the distance between the jaws when at rest) being the same, while the sides (the upper and lower incisors) are lengthened, it follows that these must meet at an angle that becomes acute in proportion to the lengthening of the teeth. It is owing to this changed relation of the teeth to each other and to the distance between the jaws that protrusion is effected. In these cases the facial angle remains virtually the same; the alveolar process is diseased ; the state of the lower maxilla has nothing to do with the defect. Both upper and lower incisors protrude in proportion to the extent of the disease. The gums are chiefly affected, as every practitioner knows.

FIG. 6.



The points to be observed in connection with this form of irregularity are:

1. Facial angle normal.
2. Alveolar process, as to contour normal, tissues more or less destroyed.

3. Lower maxilla not affected.
4. Upper incisors protruding and pushed out of their sockets.
5. Occlusion defective, varying with progress of disease.
6. Gums diseased, and more or less destroyed.

Conclusion.

It will be seen from a comparison of these six forms of anterior protrusion, that the phenomena that strike the casual observer as very similar are due to a variety of very different causes. The first form alone is due to what I have termed constitutional causes, that is, an ill-balanced osseous system ; the last is generally ascribed to diathesis, while the four remaining forms are accidental. In the first form the osseous system is affected, in the rest the alveolar processes and the teeth. Owing to these facts, in only the first form does the lower maxilla partake of the defect, while in the rest its form is independent,—that is, it may be normal, or subject to excessive or arrested development. For the same reason only in the first case is the facial angle affected by this irregularity.

In the first form the osseous portion of the upper maxilla is the force, while in the rest the alveolar process and teeth. The bite varies with the cause, but is defective in every case. The gums are necessarily affected in the last. The features that these irregularities have in common are anterior protrusion and defective bite, varying in every case, but affecting the appearance of the patient in proportion to extent and duration. A diagnostic distinction of these irregularities is absolutely necessary to the determination of the methods used for correction. An upper jaw the osseous plate of which is abnormally developed, with a normally developed alveolar process and teeth, is practically hopeless, while those forms in which the teeth and processes are abnormal are the proper field for the efforts of the practitioner. It would be useless to attempt the correction resulting from malocclusion due to the loss of posterior teeth by appliances that would be effective in the correction of the V-shaped arch, while a protrusion resulting from an excessive deposit of bone-cells requires entirely different treatment.

Failures in the correction of irregularities are largely due to a want of recognition of etiological differences. There is no department in dentistry that affords more interesting study to the etiologist than these cases, inviting careful observation and subject for thought in every instance.

THE DIFFERENTIATION OF ANTERIOR PROTRUSIONS OF THE SUPERIOR MAXILLA AND TEETH.

	FACIAL ANGLE.	ALVEOLAR PROCESS.	LOWER MAXILLA.	UPPER INCISORS.	OCCLUSION.	GUMS.
I. Anterior protrusion due to constitutional causes.	Normal.	Normal.	Antero-posteriorly shorter than that of upper jaw.	Either vertical or turned in toward lower incisors; never diverging.	Molars usually normal, but anterior teeth projecting.	Usually healthy.
II. Anterior protrusion of the alveolar process and teeth from excessive deposition of osteoblasts.	Less than normal.	Alveolar process of upper maxilla excessively developed *anteriorly*; lower process developed *vertically*.	Not affected.	Protruding and more or less diverging.	Bite of molars too short.	Usually healthy.
III. Anterior protrusion of the V-shaped arch.	Normal or nearly so.	Apparently normal, flexed anteriorly as indicated by crowded incisors.	Not affected.	Crowded, forming an angle at about the mesial line; converging.	Usually more or less defective.	Usually healthy.
IV. Anterior protrusion resulting from thumb-sucking.	Normal.	Normal or arrested.	Not affected.	Flaring or diverted to one side.	Normal, except in region of deformity, where it is defective.	Usually healthy.
V. Anterior protrusion due to malocclusion resulting from the loss of posterior teeth.	Normal.	Normal.	Not affected.	Upper incisors protruding; more or less diverging.	Closer than normal.	Healthy or diseased.
VI. Anterior protrusion from pyorrhea alveolaris.	Normal.	As to contour normal. Tissues more or less destroyed.	Not affected.	Protruding and pushed out of their sockets.	Defective, and varying with progress of disease.	Diseased; more or less destroyed.

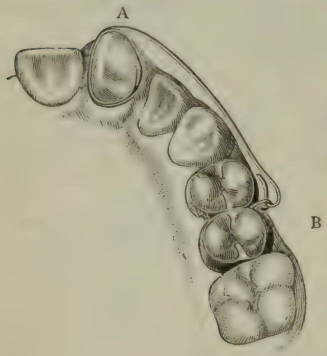
TEETH-REGULATING APPLIANCES AND RELATED DEVICES OF THIRTY ODD YEARS AGO.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

HISTORICALLY considered, many most useful contrivances will be found to have been reinvented from time to time until the successive periods have become so numerous that the names of the first originators are discoverable only by painstaking research among remaining records, if, indeed, the earliest publications should be no longer accessible. A further element of uncertainty is the frequent obscurity and incompleteness of the descriptive terms in which the forms and arrangements of material structures were sought to be set forth ; whereas an illustration, even if rudely drawn, would convey a clearer idea of the several parts of an operative device than many words, however skillfully chosen.

Pictorial representation is now largely relied upon to impart correct notions of the character of constructions in every useful form, and this is particularly true of appliances for the correction of irregularities of the teeth. Some of these as shown in modern publications have features familiar to dentists of long experience, yet the mere recounting of such personal recollections might not be deemed conclusive to an ordinarily skeptical mind, and it was therefore with some degree of individual interest that in a recent rearward glance over the files of some dental journals there were discovered illustrations, some of which are appended, printed from electrotypes taken from the original wood-cuts without the slightest change or alteration in any of them.

FIG. 1.



In the *Dental News Letter* for January, 1854, on page 70, Dr. T. W. Evans, of Paris, describes an apparatus for "restoring an oblique upper incisor to its place." "The necessary space obtained, I take a piece of fine hard-drawn wire, about the size of a common pin, and winding one end of it twice around the middle of the oblique tooth, very closely, I pass the other end along to the bicuspids or molars, to which I attach it by means of a joint-mechanism of two nicely adjusted bands or rings,—forming a kind of yoke, which is slipped over two of the bicuspids or molars, and is prevented from slipping up to the gums by means of wire clamps which hook on to their grinding-surfaces." (Such spring-lever rotators are now made of piano wire (Fig. 1, A). These "bands or *rings*," or "*skeleton caps*" on single teeth, or "a kind of yoke" (Fig. 1, B), when coupling two adjoining teeth, were often made by the mechanical dentists of twenty-five years ago, but many of those who are yet among us were not writers for the press, and illustrations were then rare, and so it comes to pass that many well-known devices are not a matter of indisputable record, as it is an object of the present writing that some of them shall henceforth be.) "These clamps may be so constructed, when an operation requires it, as to prevent the teeth of the upper and lower jaw from coming in contact with or overlapping each other." (Fig. 2 shows such "wire clamps" on a molar "ring," or collar, C. See also C′.)

"It will be seen at once that if this apparatus is rightly applied, the hard-drawn wire being elastic, and serving at once as lever and spring, will bring the oblique tooth round to its place in a short time.

FIG. 2.

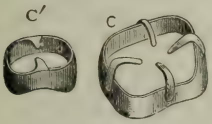


FIG. 3.

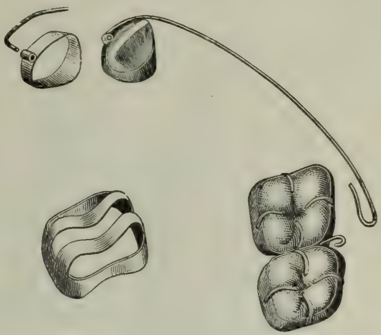
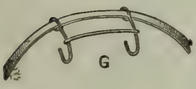


FIG. 4.

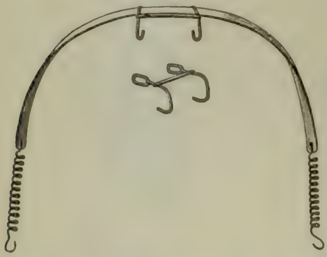


But in all cases where, from the age of the patient, or for any other cause, the tooth is too refractory to submit to so gentle a lever, I modify the apparatus as follows:

"First, carefully adjusting a gold band (made of 22-carat gold, so as to be sufficiently malleable) round the center of the tooth to be operated upon. On the front of this band, and directly across it, I solder a small gold tube, the bore of which is about the size of a common pin; through this tube I pass a hard-drawn wire, fitting very closely, and then attach the outer end of it (which has a loop or eye for the purpose) to the yoke or skeleton cap above described, which is previously fitted to two of the molar or bicuspid teeth." (Fig. 3 depicts a "gold band" ferrule or collar, with a soldered section of "small gold tube" or *pipe* as a socket for the moving spring wire. It also exhibits the *collar* and *pipe* in place on the tooth to be rotated or otherwise moved by the spring-wire lever hooked into the "skeleton cap fitted to two molar teeth.") "In this way it will be seen we have a more powerful lever than before, and one which is equal to any emergency. The operation being completed, the tooth is kept in its place by means of a small flattened wire (somewhat smaller than a knitting-needle), which I pass in front of the incisors as far as the eye-teeth on each side, to which it is attached by means of silk ligatures ; this wire band is prevented from slipping up by means of a small framework with two hooks, which I solder to it, and which, taking hold of the cutting-edge of the central incisors, afford a firm and steady support." (Fig. 4 shows the flattened wire retainer with hooks, G, to rest on or between the front teeth. The retainer is to be ligated to the teeth.) "It is obvious that the wire band thus arranged and sustained will easily keep the restored tooth in its place. The length of time it must be worn depends upon circumstances. It should be removed as often as possible, for the purpose of cleansing.

"*Protrusion of the Front Teeth.*—I remedy this irregularity by means of a narrow elastic bar of gold, which is attached to the front of the teeth to be operated upon by means of a kind of wire grating, constructed with hooks which take hold of the cutting-edge of the central incisors, and keeps it (the bar) in its place." (Fig. 5 shows adjustable limiting hooks to slide on the regulating bar or bow-spring and prevent it from touching the gums. It also shows the "wire grating" limiting hooks in place on the bar, which is provided with retracting spiral springs.) "Having slipped this bar into the grating firmly, I pass the ends along to the two strongest molars on each side, to which it is attached, by means of short spiral springs ; the molars used for support having previously had fitted to them the yoke or skeleton cap already described. Now, to give this elastic bar, with its spiral springs, an absolutely firm and steady support, which shall have its pressure equally distributed over the mouth instead of being confined to one or two teeth, I prepare a thin gold plate of the most delicate workmanship, which is molded carefully to the roof of the mouth, and kept in its place by attaching it to the molar teeth by the apparatus which already secures the gold bar. This plate, if nicely molded to the irregularities of the mouth, has its pressure, as I have said, equally distributed, and renders it impossible that the teeth used for support should be loosened, since they are sustained by the whole palatine arch against which the plate presses. The elastic bar, with its spiral springs, has thus the firmest and steadiest hold possible, and

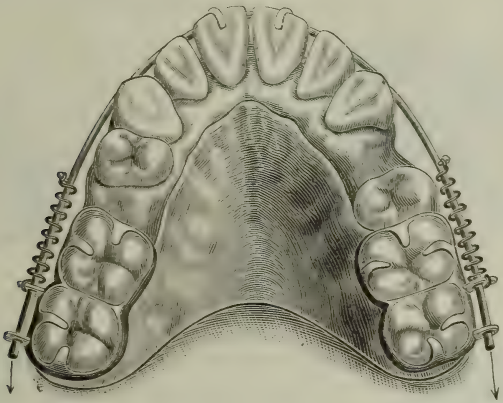
FIG. 5.



can only move the teeth which it is intended to move, and these it brings easily and quickly to their place." (Fig. 6 shows clearly this apparatus.) "The patient easily gets accustomed to the apparatus, because of its great delicacy of construction and finish. I should add that, as the teeth come gradually back to their place, they will naturally force the gum inward. The plate must, therefore, be removed several times during the operation, and be modified both in size and form, care being taken always to have it nicely adjusted, and to keep it at least one-third of an inch from the backs of the teeth to be operated upon. . . .

"The next step is to adjust the yoke or skeleton cap already described, to the two strongest molars on each side of the mouth. Next, molding the gold plate to the roof of the mouth in the manner mentioned in the last case, commencing pretty well back, and coming forward to within about one-fourth of an inch of the deviating teeth; this plate is attached to the molar teeth by the mechanism just alluded to—the whole forming, in fact, but one apparatus, each part of which is necessary to the other and to the whole. Having thus secured the strongest and steadiest support, I solder one end of a gold wire (of about the size of a knitting-needle) to the face of the innermost ring attached to the molar teeth, and as near as possible to the back edge. The other end of this wire (the whole being hardened and flattened from the soldering point) I pass along on the outside and parallel to the margin of the gum, at about one-sixteenth of an inch distance from the teeth, and slide it into a small tube, which had been previously soldered for the purpose, to the back edge of the skeleton cap, adjusted to the molars on the opposite side of the mouth. This bar is kept from slipping too far through the tube by being

FIG. 6.



tapered at the end, which causes it to enter like a wedge ; on the other hand, it is kept from receding from the tube by means of a small nut, or by being flattened at the end." (Fig. 7 shows the spring bow with skeleton-cap anchorages or abutments, and elastic ligatures for moving teeth outward.) "The average width of the bar is about one-sixteenth of an inch. I curve this bar along the margin of the gum, as already described, and then attach each of the deviating teeth to it by means of circular India-rubber bands cut from a pipe or tube ; these bands are first slipped over the tooth, then stretched under the bar, to be brought up on the other side and reattached to the tooth, by which means they have a firm, double hold and traction. . . .

"Another way of keeping the plate in its place is to let it extend back as far as the first bicuspid, and solder a tube to it on each side, with the mouth opening against these teeth ; into these tubes is inserted a piece of hickory wood which swells enough to afford a sufficient support. . . ." (Fig. 8 exhibits a roof-plate retained by the endwise swelling of wood cylinders in closed tubes previously soldered to the plate. It was subsequently found that the dry cylinders would swell enough to *move* the teeth against which they impinged, and such wood cylinders, extensible endwise by swelling, were soon employed for regulating purposes, if indeed they had not been previously so used.)

FIG. 7.

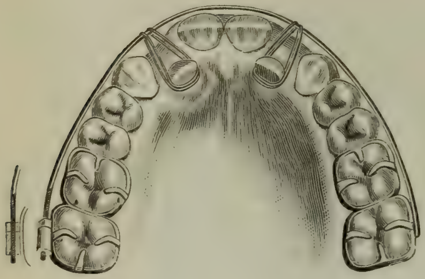
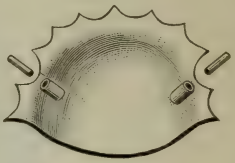


FIG. 8.



"First, I adjust the yoke or skeleton cap, already described, to the molar teeth, which I prevent from being loosened or displaced by means of the gold plate molded to the roof of the mouth. I then solder *one end* of a gold wire to the back of the skeleton cap, and having hammered the rest from the soldering-point, so as to make it elastic, I curve it inward toward the eye-tooth, against which the *other end* of the wire presses gently, operating as a spring, and aiding and directing the tooth to its place." (Fig. 9. This is one of the most effective and controllable among the many devices described, although more elaborate in construction than is necessary for the moving of a single tooth.) "If the protrusion be such as to require it, the wire may be crooked where it touches the eye-tooth, so as to bring it both inward and downward. . . ."

The article is not illustrated, and the preceding excerpts are limited for lack of COSMOS space, but the reader of current dental literature can readily supplement the descriptions and the foregoing figures, partially embodying them by reference to modern cuts and constructions exemplifying the ideas of Dr. Evans. The cuts which follow are exact duplicates of the cuts referred to.

FIG. 9.

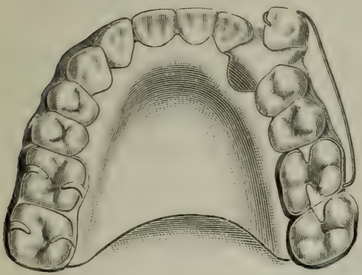
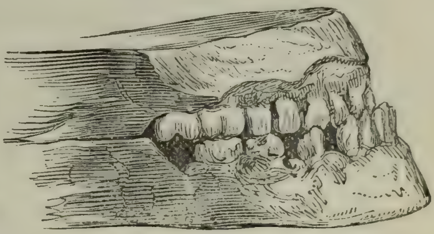


FIG. 10.



On page 101 of the journal referred to, the editor, Dr. J. D. White, of Philadelphia, discourses on the same subject, and on page 103 illustrates a fixture for pulling backward projecting lower teeth, after suitably forcing forward by means of inclined planes the retreating upper teeth shown in Fig. 10. A careful inspection of Fig. 11 will disclose a substantial recorded anticipation of the fundamentals of bridge-work, wherein the pier teeth have *skeleton cap crowns* which by means of lugs covering the grinding-surfaces of the pier teeth resist thrust

FIG. 11.

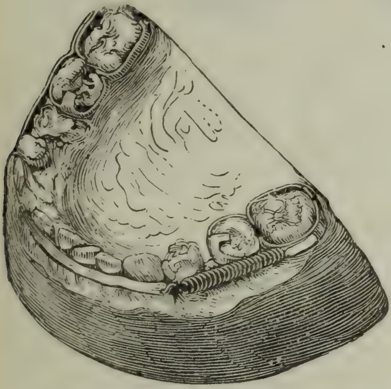
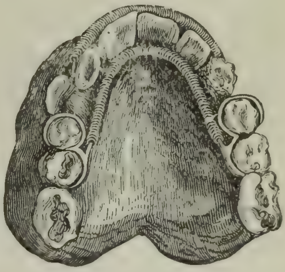


FIG. 12.

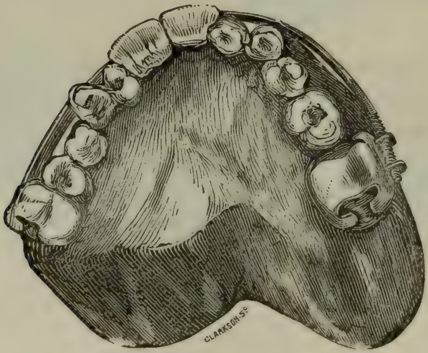


toward the gums, and so support the regulating bar between the piers that the natural teeth may be held in place by attachments to the bar, or be moved by imparting a spring action to the bar.

Some four years previously Dr. White had first employed the spirally wound spring for pushing out or pulling teeth into line, as shown by Fig. 12, from page 85 of the *News Letter* for July, 1850, and in our Fig. 7 it is seen combined with the bar as described by Dr. Evans. Dr. White says, "I also use the spiral spring for turning teeth that stand across the alveolar ridge."

In the *News Letter* for July, 1854, on page 221, Dr. H. S. Burr illustrates (Fig. 13) the current mode of sustaining a bar between its piers. He says, "I commenced by fitting skeleton caps (of gold) to the first molars; a stiff bar was passed in front, one end soldered to one cap, the other end sliding in a groove." The description is meager, but the cut shows two forms of "skeleton caps": that on the right surrounding the first molar, and partly capping its crown, while that on the left molar almost completely caps the crown which it nearly surrounds.

FIG. 13.



The cut also suggests, if it does not show, one end of the bar threaded and passing through lugs on the left molar cap so that the threads of the bar may engage the edges of the holes in the thin lugs through which the bar will slide if properly manipulated, yet will in use be kept locked at the point to which it has been adjusted. Obviously a nut fitting the screw would add a common means for endwise adjustment, and other like devices would readily occur to practitioners familiar with expedients like those shown in Fig. 6.

(To be continued.)

THE DENTAL PULP.

BY W. XAVIER SUDDUTH, A.M., M.D., D.D.S.,

Professor of Pathology and Oral Surgery in the University of Minnesota.

OBJECTION has been raised against the use of the term dental pulp, some holding that the formative organ of the dentine should be called the dental nerve, as it is even now designated by the laity, because of the fact that when in an inflamed condition it is extremely sensitive.

Considered from the stand-point of histology and compared with other portions of the body, we find that it is much less highly organized and presents few of the special characteristics which entitle it to classification as nervous tissue. The greater portion of the mature pulp is composed of ordinary connective-tissue elements, being made up of filiform and fusiform cells presenting no regularity in arrangement, but crossing and anastomosing in all directions.

Upon the surface of the pulp, forming part of it, is a layer of cells termed odontoblasts. They are developed from the ordinary embryonic connective-tissue cells, but are specially endowed with the function of secreting the dentine. These cells are possessed of one or more fibrous prolongations which extend into the tubuli of the dentine. To these fibers of the odontoblast has been given the name of dentinal fibers because of their location.

The pulp is a very vascular organ. Its blood-supply consists of a few vessels of considerable size and numerous capillaries, which ramify throughout the entire organ.

It is also well supplied with nerve-elements. These consist of medullated and non-medullated nerve-fibers which terminate in the odontoblastic layer. They do not, however, present the same fineness of subdivision as is found in the terminal nerve-fibers of the cornea.

Some writers hold that the sensitivity of inflamed dentine in decay indicates the presence of nerve-fibers in the dentinal tubuli. Such is not necessarily an absolute deduction, as an inherent property of protoplasm is the power of conducting sensation, which latter is not confined to nerve-fiber alone. It is also well known that in inflammation this property is highly exalted. The term sensitive dentine is a misnomer, as the sensation is confined to the dentinal fibrillæ, and the degree of sensitivity is in the inverse ratio to the attenuation of the fiber, hence the most sensitive point is found at the union of the enamel and dentine, where the fibers reach the finest subdivision. The more delicate the filament the more exalted its power of transmitting sensation, and inflamed dentine does not present any distinctive features not exemplified in other portions of the body under similar inflammatory conditions.

The most common conditions of inflammation that dentists come in contact with are pulpitis and periodontitis. They are not, as a rule, called upon to treat inflammations in other portions of the body, consequently are but little acquainted with inflammation in its general aspect. There are several places where inflammation is even more intense and painful than it is in the pulp. The eye is a most notable example, also the ear and the organs of generation, not to speak of the central nervous system.

Periodontitis is allied to inflammation in the periosteum, and differs in no whit from such processes wherever found in connection with the osseous system, and is always very painful. It appears to be the tendency of dentists to magnify the intensity of the conditions they are called upon to treat, largely, as we have intimated, because of their limited acquaintance with the processes of inflammation in general; while the tendency among physicians is to minimize the conditions, because of their lack of knowledge of the special conditions found in the mouth.

It is not our intention to displace the dental pulp from the list of sensitive tissues when inflamed, because it does not differ from other tissues under similar conditions, but to compare it with other tissues in order to impress upon the mind the need of greater care in manipulation. Dentists, as a rule, when judged from the stand-point of delicacy of touch and carefulness in manipulation make a very poor showing when compared with ophthalmologists.

An indifference to expressions of pain seems to grow upon some dental practitioners as practice increases, and they find themselves growing less appreciative of the niceties of practice which gained for them their reputation as careful operators. If the above stricture is true, and we firmly believe it is, then the reputation of the dental pulp to be the most sensitive organ of the body is largely due to our carelessness as operators.

Before dentistry was known, the favorite expression for a condition of extreme sensitivity was "as tender as the apple of the eye," but now, thanks to an extended acquaintance with the operating chair, the more modern phrase, "as tender as the nerve of a tooth," has been introduced. This comparison is not intended to be invidious, nor to build up one specialty at the expense of another. It is well, however, at times, to see ourselves as others see us. Let us see to it in the future that the incubus is removed from our shoulders, and the "apple of the eye" restored to its former position as the most fitting term of comparison for extreme sensitivity.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, December 9, 1890, in the new building of the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. Sherman B. Price, of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, Broadway and Ninth street. The number in attendance was eighty-seven. Owing to a detention on the part of W. F. Ford's electrician, who was to supply the motive power to Dr. George S. Allan's engine and mallet, he was unable to operate, but has promised us that pleasure at an early date. . . . Dr. S. C. G. Watkins, of Montclair, N. J., exhibited a Watkins dental record and ledger and examining chart, which he states is an improvement on one published some years ago by Dr. W. H. Morrison, and claims is superior, as it is simple, precise, and economical. It has a diagram of the teeth and spaces so arranged that by figures and letters under their proper headings he indicates all operations satisfactorily. . . . Dr. E. T. Starr presented the new machine-made burs of The S. S. White Dental Manufacturing Company, which it is claimed are the only perfect cutting burs made. (For description see DENTAL COSMOS for January, 1891.) Dr. Starr showed them under a microscope, and by comparison with the hand-made bur demonstrated most conclusively their superiority. . . . Mr. W. F. Ford, Surgical Manufacturing Company, New York city, gave an exceedingly interesting exhibition of electrical appliances, using the Gibson storage battery. He first showed the dental engine, consisting of cable and S. S. White hand-piece attached to the C. and C. motor, run by one battery of four cells ; the same can also be used with nasal burs, trephines, etc. He then showed the use of the transluminators for the throat, nose, maxillary and frontal sinuses, cauteries, etc. A practical demonstration of translumination was given by Dr. W. C. Phillips, in connection with a paper read at the last meeting of this society. It is due Mr. Ford to say that his exhibit was a most satisfactory one, and certainly proved its advantages in our professional operations. . . . Dr. V. H. Jackson, New York city, demonstrated by casts and two cases the method of correcting irregularities of the teeth by what he terms his "crib" appliances, which are made of piano-wires without the use of plates. An able paper which Dr. Jackson read at the Berlin meeting will be found in the November number of the DENTAL COSMOS, and explains perfectly the *modus operandi*. Of the two cases presented, one was a young miss eight years of age, showing the use of the "crib" in moving the lower front teeth by spreading the arch and forcing the lower teeth forward with the body wire of "crib." The case was completed, and the same apparatus used for retaining the teeth in position. The second case was that of a boy about eight years old, showing a superior incisor closing inside the lower teeth, which was also regulated by the same method and completed. The other casts represented models and appliances in their different stages. . . . Dr. W. W. Walker, New York city, showed a novel pair of pliers invented by Dr. J. J. R. Patrick for cutting, tapering, and threading gold wire, and also barbing nerve-broaches. It is made of an ordinary pair of flat-nose pliers, and so arranged with taps, cutters, and thumb-screw to taper or thread any size of wire necessary for our use.

Dr. Kingsley. I should like to inquire of Dr. Jackson how long a time was consumed in regulating the case of that child eight years of age; where one upper central incisor shut inside the lower arch.

Dr. Jackson. Fourteen days. There was no effort made to do the work quickly.

Dr. Kingsley. Would not Dr. Jackson have got along as well if he had used an apparatus on the outside of the teeth, instead of having it inside?

Dr. Jackson. The advantage of this appliance is the rapidity and ease with which it is constructed, the whole appliance being made at the first visit; also the rapidity with which the operation is performed, and the fact that the appliance does not interfere with the articulation in any way, causing no discomfort; the patient, less than eight years of age (attending school in the mean time), was willing to return to have the spring readjusted. This tooth was pushed to proper position without any perceptible soreness.

INCIDENTS OF OFFICE PRACTICE.

Dr. Dwinelle. A word in regard to filling teeth with amalgam, and especially large crown fillings. We all admit, in later days, that amalgam is one of our best sheet-anchors. That is a good deal to come from myself, with my record behind me, because I have been perhaps a more stringent advocate of gold under all circumstances than most men. My method for years past has been to wash my amalgam very thoroughly with carbonate of soda,—common washing-soda. I have oftentimes reduced the bulk, and presumably the weight, of my material from a quarter to one-half. This is especially true of old amalgam, which has become much oxidized by age. I think that I thereby take out so much of this oxidized material, which is as black as ink, that a more perfect amalgam is obtained, and one that is comparatively stainless, in many instances entirely so. I speak of this because I know a great many advocates of amalgam who do not wash it at all. I think the very fact of our reducing the bulk to the extent we do by washing is a sufficient argument in its favor. It is certainly a more cleanly, coherent, and solid substance, so that we are more apt to have complete success with it.

In reference to the condensing of amalgam, in one sense, or rather the getting rid of the excess of mercury which, compress the mass as much as we please and force out as much as we can, still remains in excess. Many measures are resorted to for reducing this excess of mercury. Our worthy friend, Dr. Bogue, years ago advocated the use of crystal gold for the purpose of taking up this excess. It may also be absorbed with tin, which softens the amalgam somewhat. In my method I anticipate the chemistry of nature. We know that mercury volatilizes at a very low temperature, which volatilization causes the amalgam to become hard during the operation. I take a portion of the mass in hand and heat it over a lamp for a time, letting it volatilize until it becomes comparatively solid. This I use, pressing it upon that portion within the tooth which is readily taken up by the excess of mercury there, until a filling of a desirable density is obtained. A little practice will make one familiar with the working of it and give skill in its use. I had the opportunity this morning of seeing some operations in that way made some eight or nine years ago, and the success is complete. Of course the greater the excess of silver in our amalgam, the more readily it oxidizes, from its great affinity for sulphur, which so abounds in the system.

The President. Does Dr. Dwinelle remember that many years ago there was a theory advanced by Professor Boynton that in the use of alcohol, carbonate of ammonia, or any alkali which would combine with the essential oils on the surface of the skin, when the amalgam is rubbed in the hand, the amount of discoloration of the amalgam was only equal to the amount of animal oil taken from the skin?

Dr. Dwinelle. I think I remember of Dr. Boynton advancing such a theory. I learned of this good man's death a few days ago.

Dr. Nash. I would like to ask Dr. Dwinelle if by his method the entire filling is made from a mass freshly mixed for the case in hand.

Dr. Dwinelle. Not always so. That brings up another thought, and that is that the excess of Dibble's amalgam I was in the habit of laying aside and letting it become hard, and afterward using it in conjunction with a fresh amalgam, heating it, and adding to the fresh mass with heated instruments.

Dr. Nash. The reason I asked the question was that for about two years I have been using a system which goes a step farther than that Dr. Dwinelle has spoken of. I take scraps of any amalgam that has been laid aside, and on the end of a flat serrated instrument I hold it over a lamp flame, and the mercury will come to the surface or the mass will swell up. It is then in a temporary soft state, which lasts but a few moments, and can be dropped on a tablet and compressed with the instrument so that it will adhere to it. It is then heated again for a moment, and while still soft carried to the filling of fresh amalgam and incorporated with it, and this repeated, if necessary, so that when you get through you have a filling that is sufficiently hard to prevent its breaking down. The patient should be warned that a slight pain will result from the heated amalgam, which, however, lasts but a moment.

Dr. Horace Dean. How does that wear?

Dr. Nash. It wears all right, and will finish up with good clean edges and a surface which holds its color.

Dr. Dwinelle. I think Dr. Nash's method an excellent one ; it will give us stoppings of great density, the free mercury being so thoroughly disposed of. I use a heated instrument constantly in conjunction with amalgam, and when I am through, my filling is so condensed and finished so completely that it will endure all ordinary mastication without breaking down.

Dr. Hart. Mr. President, I would like to read an extract from an article headed "Pykotanin, Methyl-Violet Aniline," in *Notes on New Remedies*, published in New York, cautioning against the indiscriminate use of pyoktanin :

"The *Berliner Klinische Wochenschrift*, No. 37, 1890, says, 'In No. 22 of this journal we reported on the favorable results achieved by Stilling in the use of aniline colors for various diseases of the eye. Stilling in his paper designates methyl violet as a remedy for abscess of the cornea of all kinds, which distances all other remedies heretofore applied. Equally favorable action was claimed for it in blepharitis, conjunctivitis, etc. Directly contrary results are reported by Dr. Carl, of Frankfurt-a-M. Carl finds that in mucous affections of the eye all favorable influence must be denied to methyl violet.

"'In abscesses of the cornea the action in some cases was good, but in no instance could Carl note any improvement due to the action of the remedy. In one case of ulcus serpens, owing to the treatment with methyl violet, an interlamellar infiltration was generated, and then a ring abscess was found which dissolved the cornea. This case prompts Carl to warn against the indiscriminate use of methyl violet, so easily induced by Stilling's communications.

"'Further unfavorable results with pyoktanin treatment are reported by Braunschweig, of Graefe's clinic. Braunschweig treated seventy cases of diseases of the eye with pyoktanin. In only a few cases could evident progress be attributed to the pyoktanin; in the greater majority of cases the result was the contrary, and the action of pyoktanin fell far short of other modes of treatment. In not a few cases pyoktanin proved to be directly harmful; frequently severe pain was noted after instillation, and not infrequently conjunctivitis ensued, accompanied in three cases by pseudocroupous collection; inflammation of the cornea was also induced by pyoktanin in some cases. Pyoktanin has not justified the promises of Stilling.' (Dr. Heintz.)"

The same journal says editorially, "On another page we print in translation a contribution on the subject of pyoktanin, by Dr. Heintz, a collaborator on the editorial staff of the esteemed *Berliner Klinische Wochenschrift*. Dr. Heintz quotes various unfavorable reports, advises curtailed use of the antiseptic, and concludes with the positive expression that Stilling, who is the author of the pyoktanin introduction, has not justified his extravagant promises. In the July issue of this journal we exposed the identity of pyoktanin with ordinary chemically-pure aniline colors, and corroborative evidence has since been printed in almost all leading medical and pharmaceutical journals. Pyoktanin is merely an ingenious trade-marked name for aniline, any shade,—blue, yellow, red,—chemically pure, free from arsenic; and the fact that these products have antiseptic properties was published eighteen years ago in St. Louis by Dr. Charles O. Curtman, and many American physicians and surgeons in various localities have been quietly using aniline antiseptic solutions ever since."

Dr. Hart. I was about to use pyoktanin, and feel a little nervous about it.

The President. Gentlemen, I have the pleasure of introducing Sidney S. Stowell, D.D.S., of Pittsfield, Mass., who will describe the "simplicity" tooth-crown.

Dr. Stowell. Mr. President and Gentlemen: The subject which I have been asked to present to-night is one of vital importance to every practitioner of dentistry at the present time. It is probable that no subject has during the last decade called forth so much thought and experiment and time in our laboratories as that of artificial crowns and their setting. The several methods which have been introduced and used are too numerous for me to undertake to describe. Some have been so intricate and difficult to make that to the ordinary practitioner they have been practically an impossibility. The simpler forms of ready-made tooth-crowns have also been introduced, and I think they may be looked upon to a great extent, so far as my experience has gone, as being what a ready-made suit is to a tailor-made suit. Those especially having the dowel baked into the porcelain, although they have come in very general use, have, as you know, many weak points. Of the complicated crowns many have their good points, and all have their weak points. I have always entertained a great dislike for the all-gold crown, especially as applied to bicuspid teeth (though for live molars there is none better), and also to that crown known as the Richmond crown, having only a porcelain veneering, with gold cusps, the whole body of the crown being of solid gold. It is unsightly at best. The porcelain veneerings that are used for all the Richmond and the Low crowns, and that class, are weak. We know they are weak. Scarcely one of us but has seen those porcelain veneerings flake off. They will come off under the most favorable circumstances, when done in the best possible manner. I have seen these crowns from the hands of men whose skill none can deny, and the facings came off; I have had the facings come off of my own work, and a very embarrassing thing it is, too. When a patient suggests that they may break off and asks what we will do, we say, "Oh, that is all right; don't mind that." They come back with the porcelain veneering broken off, and we put on a knowing look and say, "That is nothing; we can fix that all right." And we go ahead and do what we know is a very bungling operation. So I say that crown is weak.

Objecting, as I did, to all-gold crowns, and necessity being the mother of invention, I was driven to that extreme two or three years ago, when I invented a crown which many of you know now as the Stowell crown; it is illustrated and described in Evans's book on crown-work, also in the Cosmos, and I also demonstrated that crown before this society two years ago this November. It is an all-porcelain crown, having a band and dowels; the dowels being set independent of the crown, as the size, number, and shape of the roots indicate, I deem to be a valuable feature of a crown. I got a fine-looking crown by it, and I have used it constantly, and many other practitioners have adopted this crown as their regular operation. But that is a laborious and difficult crown which takes several hours to make; and as my practice increased and I became very busy I was driven by necessity again to simplify that method, so to-night I will endeavor to present to you a crown for which I do not claim very much originality,—I am not very vain of it. I have named it the "simplicity crown," and yet, so far as I can see, it embodies very many of the desirable features of a tooth-crown. In regard to the weak points of it, no doubt it has them. When I was a lad and attended school, we used to speak pieces, and one of those which I memorized at that time has done me a great deal of good ever since.

A few lines of it I will give you. It is from the pen of Oliver Wendell Holmes, and is entitled "The Deacon's Masterpiece; or, The One-Hoss Shay":

"But the deacon swore (as deacons do,
With an 'I dew vum', or an 'I tell yeow')
He would build one shay to beat the taown,
'n' the keounty 'n all the kentry raoun.
It should be so built that it would'n break daown:
'Fur,' said the deacon, ''t's mighty plain
Thut the weakes' place mus' stan' the strain;
'n the way t' fix it, uz I maintain,
Is only jest
T' make that place uz strong uz the rest.'"

And so I have thought, as I built on my gold corners and performed general crown operations, or those elaborately-gotten-up bridges, that this elegant piece of work is no stronger than its weakest point.

The simplicity crown is a combination of old and well-established ideas. It may be that some of you have done the same thing that I am going to show you to-night, and have not given us the benefit of it. I brought into use here a crown which was used I do not know how long ago; it was perhaps one of the first porcelain crowns that ever was made, the old-fashioned pivot tooth. My attachment to the root is by the How screw-post system. The root is prepared, and an old-fashioned pivot tooth ground into position precisely as though you were going to set it with a hickory plug; the end of the root being countersunk, the end of the crown not being materially changed, except as may be necessary to fit it nicely to the root. This is done with a common stump corundum-wheel. The end of the root is then slightly countersunk, a little more than the large wheel has done, with a smaller-sized wheel. I then utilize for my fastening a principle with which we are all familiar, and for which Dr. How, of Philadelphia, should receive great praise. I refer to the How screw-post. And let me say here that under no circumstances should that screw-post of Dr. How's, known as the "bright-metal" screw, be used unless you want to get yourself into trouble: it is composed of a base metal (pure nickel), and is wholly unfit for use in the mouth. I hope Dr. How will forgive me for that statement. Use a platinum and iridium dowel. After the root is drilled and tapped out and the How screw-post set, I then cut a groove, indicated by this black line [referring to diagram], all around the root with an engine bur, about No. 0. The post being set, the crown is put back into place. The post may be set the full length and then cut off.

In regard to the old pivot tooth-crown (Fig. 1), for the use which I make of it here I enlarge and deepen the hole a little with a diamond drill, in order that it may have a ground surface instead of a glazed surface inside for the oxyphosphate to stick to.

This groove around the end of the root is to be filled with copper amalgam, which having done, I place the crown back into place and press it down until the excess of copper amalgam is expressed on all sides. I then take the porcelain crown and fill the hole with good strong oxyphosphate of zinc, and press it back into place over the screw-post. As the excess of oxyphosphate presses out on all sides, it carries with it the excess of copper amalgam. I hold it until it hardens; and the simplicity crown is finished. (Fig. 2.)

Fig. 1.

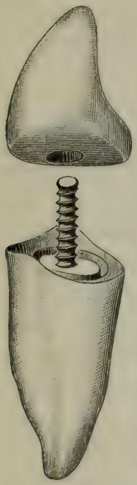
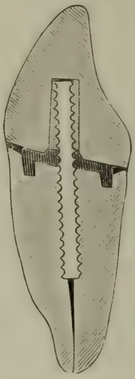


Fig. 2.



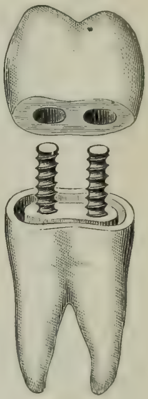
I claim for it, first, that my attachment to the root with the screw-post is the most secure of any fastening with which I am familiar. We have been accustomed to use oxyphosphate for that purpose. Oxyphosphate is opposed to moisture; and an absolutely dry root is to me a myth. We can dry a root-canal, but it remains so only until the secretions from the surrounding tissues have penetrated the root again; when we are done, that portion of the root is not dry. We all know that a root retains moisture, and although oxyphosphate fastenings to a root are sometimes quite strong, they are in many cases weak.

Another thing in regard to this screw-post: it is unannealed. It is a platino-iridium wire, taken from the draw-plate and threaded by a process of transverse rolling between reciprocating steel dies under very great pressure, and its molecules are so condensed that it is almost as stiff as tempered steel, while the dowel that is baked into porcelain can be bent with the thumb and finger. That crown does not appeal to my mechanical reasoning as being strong enough to withstand a strain like that required of it in actual use in the mouth. I have seen, in my practice, probably twenty-five crowns having the pin baked into them where the pin had stretched and the crown was projecting. There is material enough in most of these dowels to be very strong, but it is so thoroughly annealed that it stretches very easily. I can readily bend one of these dowels with my fingers in any direction, as you see.

In this crown I use no gold whatever, and require neither blowpipe, soldering, nor investments. Just notice what I have left out of the ordinary crown operation. I have not prepared this root around the edge for a band, I have fitted no band to it, and I have not had to wait for the investment to harden, dry out, heat up, and cool off. Again, the copper amalgam over the end of the root forms a cap, and by fitting into the groove forms a ferrule, also, and I claim it is an absolute preventive against decay of that root while that copper amalgam cap is retained. You may say that it will turn dark, but copper amalgam that is not on exposed surfaces will not turn black, but more of a steel-gray.

Now, a crown is no stronger than its weakest point. All porcelain when baked upon platinum dowels or pins has checks in it, which can be seen under the microscope or with the naked eye, and the teeth sometimes break at those points ; but a crown which is baked around a hole has no checks. Very rarely have we seen an old-fashioned pivot tooth broken in two. This form of crown I have used for several years without having one broken or checked. I have put it in the most exposed places. In one case I placed two of them upon two central incisor roots for a patient whose occlusion came on the tips of the teeth, and all of the molar teeth being gone the strain of mastication came upon them. I instructed the patient not to spare them ; that I would guarantee them not to break. He has used them without fear, and they have become nicked upon the cutting-edge, and yet they have stood for two years solid upon their foundation. The crown represented here [in chart] shows a biscuspid having two holes, which form of crown, so far as I know, has not been put on the market. I have baked it myself. (Fig. 3.) I do not think any dentist is practicing to the best advantage unless he can bake his own porcelain teeth as the case requires. I use the Stoddard-Parker gas furnace, and I bake porcelain teeth in just ten minutes from the time I light it. I am not interested in the sale of that furnace.

FIG. 3.



Here [referring to the chart] is shown the copper amalgam. This copper amalgam dipping into that groove forms a nut around the screw, and braces the screw where it needs it most. That screw can neither tilt nor tip. The attachment to the root is so strong that I believe any ordinary root can be extracted by taking hold of this crown with the forceps.

If oxyphosphate is a good enough cement to fasten to a root gold and porcelain combination crowns, if it is good enough to attach that dowel to a root, how much more is it a good cement to hold together two perfectly dry surfaces that do not become moist. I have cemented a dowel into several of these crowns and tried to remove it, and in one or two cases have broken the porcelain in trying to remove it.

This method of attachment is equally applicable to bridge-work. We may make that foundation, put in our copper amalgam, and make a gold or porcelain bridge, and perforate it for the dowel and attach with gutta-percha, and get a removable bridge.

One of those bridges I was not more than thirty minutes in making. I fitted on my bicuspid, then set on a bicuspid alongside of it, and fastened them together with tooth-body, inserted a platinum bar, and baked all together. The bar was then secured by filling it into a slot cut in the filling of the adjoining molar. [Model passed around, Fig. 4.] I cannot see why it is not a very strong piece of work. I have not seen one break.

It is applicable to a class of roots which cannot be so strongly crowned, in my opinion, by any other method with which I am familiar. We can take this method of crowning a root broken off or decayed below the gum line; if the gum line comes above the edge of the root, we can with cotton press the gum away, especially with bicuspid roots, and if we can get hold of the root by a good screw-thread of one-eighth of an inch below the surface, we can run those screws in and then restore the rest with copper amalgam, then put on this crown, and we get one that is very strong and that will hold. (Fig. 5.) I cannot attach a crown to such a root as that by any other method. I have several in use where I have gone down below the edge of the gum for attachment, and they are doing good service.

FIG. 4.

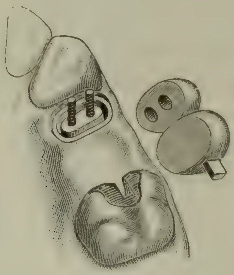
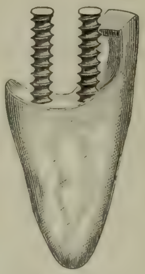


FIG. 5.



This crown may also be set under water, with the exception of setting the oxyphosphate. The copper amalgam will go into the grooves, or into a root, under water, and set just as good as if put in dry. Gutta-percha may be used instead of oxyphosphate, with good results. I also recommend the "Howland" all-porcelain crown to be set by this method; the bicuspids and molars should be ground out with diamond drill.

I have tried to present to you this crown as simply as possible. If there is any point which I have not made clear, I will be very glad to answer any questions which may be put to me.

The President. Gentlemen, this very interesting discourse upon tooth-crowns is before you for discussion.

Dr. A. R. Starr. Mr. President, I want to ask how the doctor fastens the post in the root; whether with oxyphosphate, or by screwing it into the root.

Dr. Stowell. By tapping out the root and using a screw-post, as I have already stated. We have three drills and three taps, and three sizes of screws. I have used the first size for all single-root teeth; for bicuspids and molars I frequently use the second and third sizes. I have in some cases set the screw with oxyphosphate, where the hole in the root had been reamed out too large for the screw-thread to hold.

Dr. Starr. I have used a similar method in setting what is called the Howland crown. It is a hollow countersunk crown, and can be adjusted over either a single or a double pin, and can also be used for molars. I presume the reason I have had trouble with it is because I used the ordinary bright-metal screw-post. When I put in the post by screwing, I found I had not got a tight joint, and the post would finally loosen. But by fastening the screw-post in with oxyphosphate I found it held much better. I have a crown similar to that in my mouth now, put in two years ago,—a bicuspid crown,—having two screw-posts fastened with oxyphosphate in the root, and amalgam covering the face of the root. I have put in these Howland crowns, fastening the screw-posts in that way, as long ago as four years, and they have lasted very well. It is probable that these crowns, being more hollow than those Dr. Stowell uses, are more apt to break.

Dr. E. Parmly Brown. Mr. President and Gentlemen, Dr. Stowell has given us a very nice illustration of a beautiful system of crowning. If there is anyone here who calls himself a dentist who will line a lady's mouth, either inside of the arch or out, with gold so as to have it visible, he is committing an offense against the artistic if the gold remains there as a permanent fixture. I am delighted to see that Dr. Stowell has taken from the teeth of his patients the bands which are so unsightly and which so often irritate the beautiful membrane around the teeth, which should in most cases be left undisturbed.

Dr. Kingsley. Mr. President, I do not want to throw cold water on this entertainment, but while I was listening to the admirable descriptions of our essayist this evening I could not help thinking that he had just discovered Adam and Eve. One of the first things that I ever did in dentistry was to set a pivot tooth of the kind that he calls the "simplicity" tooth, and I kept on setting them year after year. I never yielded to the prejudice that became almost universal in our profession against pivot teeth, which grew up in the minds of almost every practitioner of dentistry except the elder ones, during the period from 1860 to 1880; so much so that I would frequently hear patients say they had been in the hands of some gentleman who talked about pivot teeth as disgusting things, unfit to be put in the mouth. But I went on setting them just the same. I have recently reflected somewhat upon the alleged great improvement that has been made, and the change that has come over the profession since 1879 in regard to pivot teeth. And I have some doubts if the average durability is now any greater than that of the old condemned pivot tooth with a hickory pivot. When Dr. Richmond came to New York from San Francisco, he came first to my office, and I introduced him to the society that met in Dr. William H. Allen's house, on Eleventh street, a short time after. I took an interest in his pivot tooth, and spoke of it at that time as being an improvement that I thought worthy of the notice of the profession. I had been setting pivot teeth up to that time principally with the old-fashioned hickory pivot; I have seen a pivot tooth, set on a wooden pivot, that had been in the mouth for thirty-four years. I do not know that you can beat that with your iridium and platinum or any of the new-fangled notions that you get up.

The objection in those days against pivot teeth was that the work was so unskillfully done. I have seen many such teeth where there was no accuracy of adaptation of the crown to the root. But I took just as much pains in those days as I would now, with all the talk about the necessity of having accurate adaptation in order to prevent decay of the root. I resorted to various means of protecting the root. In the first place, the adaptation was made as accurate as I could make it with all my skill; second, I would in many instances put some gutta-percha in the joint to make it tight. I found that a dry wooden pivot, set in a root dried out, and in a straight line with the hole in the crown, would stand for years. The objection was where you found the hole in the crown did not correspond, or was not in line, with the hole in the root. I overcame that in this way: I found that the irregular surface of the hole in the porcelain crown gave an admirable opportunity for holding a pin that could be soldered there; a piece of gold wire set in the hole of the crown and gold solder flowed about it made it so firm that it seemed as though it was united with the porcelain. I do not think there was any checking of the porcelain crown around it. By warming it and setting with gutta-percha you would get a very firm attachment. There are many instances to-day where gutta-percha is perhaps a better substance for that purpose than any other.

I do not want to take away from Dr. Stowell any credit, because I think he is entitled to credit for the rediscovery of a very old and valuable method. He has gone back to where we were fifty years ago.

Dr. Ottolengui. I only want to ask one question. Dr. Brown said it was inartistic to put anything besides an all-porcelain crown on a tooth. Suppose there came to him a molar with the buccal wall gone and the pulp alive and not exposed, would he think it better to destroy that pulp and put on an all-porcelain crown, or to put on a gold crown?

Dr. Brown. I certainly would not crown that tooth at all. I would fill it with gold.

Dr. Ottolengui. It would show just as much as a gold crown would.

Dr. Brown. In some cases I might fill with amalgam. Dr. Ottolengui's question conveyed to me the idea that this molar which he spoke of was visible. I am putting on gold crowns all the time, pure gold crowns when I can get them, no copper or silver alloy in them; but in this case that Dr. Ottolengui spoke of I understood him to say, in answer to my remarks about not having gold show, that the tooth was visible. Where they are out of sight in the back part of the mouth, there is no better operation than a gold crown well set. For the labor you put on them and the money you can make out of them, it is the best operation done in dentistry.

Dr. Ottolengui. I will illustrate, if I may, on the blackboard what I mean exactly. What I alluded to was a conspicuous molar, say a sixth-year molar in the superior jaw, which comes to us broken down like that [demonstrating on blackboard a molar with two-thirds of crown lost], and at the same time the pulp is alive. To fill that with gold or amalgam I maintain that some sort of undercut must be made to hold the filling; and that undercut necessarily approaches still nearer to the pulp. As to exposure of gold, you save simply the little which equals the width of tooth remaining between the filling and the gum line; a mass of gold will show any way; therefore, esthetically, you save very little. As to amalgam, I do not think it enters into the question at all. There are two kinds of crowns that may be put on that tooth. If it is in the mouth of a person not under close inspection, I should put on an all-gold crown. There is no base metal in it except a little twenty-carat solder, and you can use that so that it does not show. If the patient is an actor or an actress, or minister, or other person who speaks from an elevation, then it becomes necessary to proceed differently. I put a gold band around the root and set one of those porcelain-faced crowns; all that can be seen is the porcelain. Dr. Brown said you must not use gold in any case: We would have to kill the pulp sometimes to avoid doing so.

Dr. Brown. Are you sure we would have to kill the pulp?

Dr. Ottolengui. I don't see how you can place a porcelain crown on a molar which has a living pulp.

Dr. Brown. I make this crown hollow, and fasten it on with oxyphosphate; and the oxyphosphate does not disintegrate at all. If the strain came on the outer portion of the crown, it might loosen it. In the case we are speaking of I understood that the buccal surface was decayed, not that the crown was gone. This tooth could be beveled in that direction [diagram], a porcelain crown adjusted, and the pulp remain alive; a porcelain crown can be fitted without putting it under the gum.

Dr. Kingsley. A gentleman consulted me recently whose front teeth were worn off nearly to the gum. He is a distinguished public speaker, and his chin was approximating his nose. I set four porcelain crowns upon the four incisors, elongating them to what they probably were originally. The cuspids could be built down, and they were extended a little with gold and made to antagonize the opposing teeth by building up the lower ones a little also. Back of the cuspids in the lower jaw I put gold crowns on every tooth, on each side of the mouth, covering the teeth entirely down to and under the edge of the gum, giving him grinding-surfaces as good as he ever had, and opening the jaws to correspond with the length of the new incisors. The incisor crowns set were substantially Richmond crowns, having a ferrule around the root and lined with gold.

Dr. F. A. Roy. The description Dr. Stowell has given us of the making of a crown without a ferrule is a most interesting one. If he has discarded the beautiful ferrule crowns which he formerly used, I would like to know why he has done so. The ferrule, I believe, saves the root from splitting.

Dr. Stowell. I have not given them up. I have made within two or three weeks a dozen of the same kind of crowns which I demonstrated before this society two years ago, combining band, cap, and dowel with an all-porcelain crown. I have made one within three days. But I say I was driven to making this all-porcelain crown by necessity. I had become very busy in my practice, and I wanted something simpler, and yet combining strength with simplicity. I claim that this crown which I have presented, having copper amalgam filled into the groove around the root, especially in crowns having one dowel, is almost, if not quite, as strong as though it had a band on the outside. A root having two or more dowels cannot split even without a band.

I had the fortune (or misfortune) of being born and reared a poor farmer's boy away back in the rural districts. We used to lay pump-logs to bring water from the spring down to the barn, and we bored holes through these logs, and took iron rings and drove into the ends of them. I have taken up such logs that had been in use for fifty years, and have never found one split or sprung. This copper amalgam being set down in that groove has just as much the effect of a ferrule on the root as though it went on the outside. I made this crown because it is simpler. I admit that mechanically, to hold it up and show you, a tooth with a gold band around it appears stronger, but in the mouth we have to crowd that band under the gum to secure it and get it out of sight, and it often produces irritation there. That band is certainly an irritant, and I have tried to get rid of it in this way.

From fifteen to thirty minutes is sufficient time for making and putting on one of these crowns. If the root should throw the post a little out of line, we can bend it with pliers in the mouth to the proper position before cementing the crown.

In case it is necessary to withdraw the post, place a screw-driver in the slot and it can be taken out in a minute. If the porcelain crown should break, five minutes is enough to repair and make it exactly as good as it was in the first place. The foundation is there for all time ; the root is preserved against decay, and the post and root are permanently attached to each other.

Dr. Freeman. Did you ever place any Bonwill crowns by the same method, using the same post?

Dr. Stowell. I have not. My reason for not using the Bonwill crown is that I dislike any crown having a perforation. The perforation through the Bonwill crown weakens it, and it is wholly unnecessary for this work.

On motion of Dr. Dwinelle, a vote of thanks was extended to the lecturer of the evening.

Adjourned. B. C. NASH, D.D.S.,
Secretary.

UNION DENTAL MEETING WITH THE NEW ENGLAND DENTAL SOCIETY.

(Concluded from page 64.)

THIRD DAY—*Afternoon Session* (continued).

DR. A. W. HARLAN read a paper on

THE DENTAL PULP, ITS DESTRUCTION, AND METHODS OF TREATMENT OF TEETH DISCOLORED BY ITS RETENTION IN THE PULP-CHAMBER OR CANALS.

The essayist assumed that the destruction of the dental pulp in a permanent tooth is a foregone conclusion after the loss of a portion of its substance by exposure or when inflamed and congested from a near or total exposure. There are minor exceptions, as, for instance, the loss of a portion of the crown by accident or the exposure of a pulp in an incompletely developed tooth. In such cases attempt should be made to preserve its vitality, as also in all cases where it is accidentally uncovered in excavating a cavity. He disapproved of the practice of driving the pulp out of the root, and gave numerous objections to that method, among which he believed the discoloration sooner or later of the tooth was almost inevitable. The permanent retention of a coagulant in the root of a tooth as the accompaniment of or ingredient in a root-filling was almost sure to be disastrous, resulting first in discoloration and second in a low form of irritation of the cementum and pericementum, impairing their vitality, and later in the production of a blind abscess, which may be likened to a smouldering volcano, or otherwise to the establishment of an abscess with a fistulous outlet, which could only be relieved by the removal of the filling, including the wooden point, the curing of the abscess, refilling the root, bleaching the crown, and refilling of the original cavity. If any red blood-corpuscles are allowed to remain in the root or are adherent to the wooden plug, additional discoloration of the tooth may be anticipated. If the wooden plug should be in any sense an incomplete root-filling, an acute abscess may be the result in a short time. Another objection to the method is the liability of producing exostosis of the root. From any stand-point this heroic method of removing the pulp and using a coagulant on the root-filling is unphilosophical. There is no reason for its employment unless complete desiccation of the root is obtained, and it is then filled on strictly mechanical principles. Discoloration may usually be prevented if the following method is adopted: When the pulp is to be destroyed, the cavity of decay should be bathed or syringed with warm water, 110° to 120° F. If there be sharp corners, the crown should be trimmed with chisels or in some other way. A little square of rubber-dam, two inches or thereabouts, should be slipped over the tooth and the one adjacent (should there be one). The pulp should then be exposed, and an anodyne such as wine of opium (not carbolic acid) applied for a minute or two, after which the following paste should be used:

Acidi arseniosi, ʒi;
Cocaine hydrochlorate, ʒii;
Lanolin, ad. q. s. to make a stiff paste.

A small quantity should be applied directly to the exposure on a little square of gummed paper about $\frac{1}{16}$ inch in size. This should be covered with a pellet of cotton dipped in liquid vaseline, and the cavity stopped with soft gutta-percha or oxyphosphate of zinc. If the patient be more than twenty-one years of age, the application should remain forty-eight hours; if under that age, and over twelve, twenty-four hours; under twelve years, eight to twelve hours is long enough.

When the patient returns at the appointed time, the little square of rubber-dam is reapplied, and the dressing removed. Water and saliva must be excluded from the cavity. Nothing should be placed therein unless the operator uses it himself. Apply to the cavity immediately a pellet of cotton saturated with dialyzed iron to antidote any arsenic adherent to the pulp or the cavity of decay. Then puncture the pulp with a fine, sharp-pointed instrument. The blood which escapes should be carefully wiped out. Then apply peroxide of hydrogen on cotton with nickel-plated platinum or gold pliers until the blood is destroyed. Gently wipe the cavity with oil of cassia; absorb the excess with paper or lint, and then apply directly to the pulp a square of paper-fiber lint, wet with a saturated solution of tannin in glycerine. Cover this with gutta-percha, or, if the pulp appears to be still sensitive, apply at the same time a pellet of cotton saturated with myrtol. Then seal the cavity with gutta-percha, and make two perforations through it with a pointed instrument not larger than an ordinary pin, and dismiss the patient for eight days. At that time everything is favorable for the complete removal of the pulp. Extravasation of blood from the pulp cannot occur after the application of tannin. The blood-disks are held intact, and the glycerine has extracted the water, and the pulp presents as a shriveled, desiccated body, easy of removal. There will be no hemorrhage, because a separation of the dead portion from the living will have taken place. It may be removed entire from the root or roots, and immediate root-filling practiced. Before this is attempted the following precautions must be observed. No water or saliva should be allowed to gain access to the pulp-chamber or canal, as this would be fatal to the maintenance of the color of the tooth. Complete desiccation of the canals is necessary to the future stability of the tooth, and may be accomplished in one of several ways: heat from an electric or other cautery, by the rapid evaporation of chloroform, by the use of boro-glyceride, or aqua ammonia, or by using absolute alcohol to excess,—that is, by filling the pulp-chamber or canals with absolute alcohol and dissipating this with hot blasts from a syringe, repeating the process until absolute dryness is secured. When this is accomplished, the root may be filled at the same sitting. Introduce eucalyptol into the root on cotton or otherwise, absorb the excess with paper cones, then pump into the root or roots a creamy solution of gutta-percha in chloroform until they appear to be well filled. Then introduce slender cones of gutta-percha by heating a fine broach which is thrust into the end of the cone and carried directly to the apex, displacing the solution of gutta-percha and filling all interstices which may have been unnoticed. The object in first using eucalyptol is to facilitate the diffusion of the gutta-percha, of which it is a solvent, and thus favors the complete filling of the root. No coagulants are used in this final treatment of the root made pulpless by the arsenical paste. This paste is so composed that prompt absorption of the arsenic is assured, as lanolin facilitates absorption better than any other known agent, unless it be chloroform, and this cannot be used on account of its volatility. Although this method may seem tedious, it leaves no portion of the dental pulp to become decomposed and discolor the tooth. The usual methods of destruction and removal of the pulp are faulty and disastrous. The practice which is here described is based on a study of the prevention of discoloration by exact methods of treatment, from the time it is doomed to destruction until the root is filled. Failure to observe any of the precautions laid down in this treatise will be cause sufficient for failure. The essayist summarized the advantages of the method described as follows: Rupture of the blood-disks will not occur when tannin is placed in contact with them, and the bulk of the pulp is reduced by the abstraction of water by the glycerine, and is concreted—tanned—by the tannin. There is no hemorrhage after its removal, because it becomes separated from the living parts physiologically, as an eschar is separated from an open wound. The root may be filled at once, as there is no irritation at the apex. The whole process of treatment is aseptic, and hence the tooth and its surroundings are in the best possible condition for the completion of the operation, without liability to subsequent disturbance from microbes, decomposition, or mephitic gases. Discoloration of the substance of the dentine depends on the retention of blood or of a portion of the pulp within the pulp-chamber, or canals, or the use of coagulating agents following the incomplete removal of the pulp. Water is one of the worst things which comes in contact with a dead pulp, as the coloring-matter of the blood is extracted by its presence. He urged the necessity of excluding it from a tooth the pulp of which has been destroyed by the operator.

Bleaching Teeth.—In continuation of this subject, the essayist next discussed the methods of treating already discolored teeth. One method which he thought had not received the attention it deserved was as follows: The root having previously been filled, all decay removed from the cavity, and it thoroughly washed with aqua calcis, a freshly-prepared solution of chloride of lime is placed in the tooth and gently touched here and there with a dilute solution of sulphuric acid, less than three per cent. of acidum sulphuricum dilutum. This will liberate the chlorine, which will bleach the exposed, discolored dentine. Wash the cavity again with lime-water, and repeat the process as before, and it will generally be found that the tooth is satisfactorily bleached. The theory of this process is that the coloring-matter is so altered as to become soluble in the lime-water. Carbonic or tartaric acids may be substituted for the sulphuric.

Another method: The cavity in the tooth having been freed of grease, serum, and decay, is washed in a dilute solution of soda. Freshly-dried chloride of aluminum is placed in the cavity, and Labarraque's solution of chlorinated soda is introduced on cotton with a pair of platinum, wooden, or gold tweezers. The chlorine is liberated, and the coloring-matters are thereby rendered soluble in a solution of carbonate of soda, which may be used to wash the cavity.

Another method: Wash the cavity with a solution of biborate of soda; introduce the dried aluminum chloride, and add freshly-prepared or at least a freshly-opened quantity of hydrogen peroxide. In three or four minutes the bleaching will be effected by the decomposition of the Al_2Cl_6 in the tooth, and the coloring-matter rendered soluble in solution of carbonate of soda, which being washed out the process is complete.

Another method: After cleaning the cavity and removing all visible decay, wash it well with a solution of barium hydrate, then place powdered alum in the cavity, and add a solution of chlorinated soda, which will completely decompose the alum. After the bleaching is effected the cavity must be thoroughly washed with a solution of sodium carbonate and dried.

Another method: A freshly-prepared solution of sodium hypophosphite is introduced into the tooth, and a jet of carbonic acid is directed on it for a few minutes, when the tooth will be found to have attained its original color. The cavity must then be washed with an alkaline solution and dried.

Dr. Harlan referred to a number of other processes to be found in current journalistic literature, and concluded by offering the following suggestions:

1. The root must be filled before the bleaching process is begun.
2. The rubber-dam must be used.
3. Ordinary hydrant water, rain water, or even distilled water must be kept out of the tooth.
4. Steel or iron instruments must not be used.
5. After the bleaching is done, oxychloride of zinc of the proper color should be introduced at once.
6. When this is well hardened, the gold filling must be made immediately.
7. If the labial wall of a tooth has only the enamel remaining, the interior of the cavity must be varnished with copal-ether varnish with a bleached brush, and pure white glazed paper of suitable size carefully packed against the labial wall. The paper must not be creased or folded.

Discussion.

Dr. Thomas Fillebrown thought that though some of the theories propounded were new, as for instance the necessity of excluding all moisture from the cavity if the color of the tooth is to be preserved, no doubt they were based upon extensive experience and could be received as correct.

Dr. S. C. G. Watkins. There is an additional reason for not destroying pulps by punching them out with a stick, and that is, that that method is patented. He did not succeed in destroying pulps in forty-eight hours by arsenic ; perhaps the lanolin which the essayist used hastened the action of the arsenic. The rubber-dam should be used in all operations, even in the simplest amalgam filling. He was glad that Dr. Harlan called attention to the necessity of applying it at first, as many would not think of applying it till after the pulp was destroyed and removed. The use of tannin as recommended seems to promise well, and is worthy of trial.

Dr. Clapp spoke of a method of extracting pulps that had come under his notice. The cases were related in a paper read before the Harvard Society. The procedure was to adjust the rubber-dam and clean out the cavity so as to get access to the pulp-chamber and introduce the point of a hypodermic syringe charged with twenty per cent. cocaine. The point is to be introduced as far as possible without causing pain, and then the whole contents of the syringe forced into the canal, at first gently and then with all the force possible. Within a few minutes the pulp-chamber is opened and the pulp removed. The success of these cases as reported in the paper was surprising, and it seemed to him that the method promised to be very valuable, as a tooth from which the pulp is removed in this manner is a pulpless tooth, in contradistinction to a dead tooth, as the living membrane is not injured.

Dr. Watkins. We all got wonderful results with cocaine at first, but either the cocaine or the dentist or the patient has changed ; we do not get such good results now. There are a few patients yet on whom it will produce local anesthesia, but with the majority of them it certainly fails.

Dr. C. A. Brackett. The great difference between old and new dentistry is in discrimination of differences as shown in the paper. We are learning to attack diseased conditions rationally instead of empirically. The different processes of bleaching teeth given in the paper, based upon the knowledge of the different drugs used, is an instance of what makes the dentist a professional man instead of a mechanic.

Dr. Harlan, replying to a question why he made two punctures into the pulp-chamber, said it was because we cannot be sure we have not produced pressure upon the pulp which will set up irritation at the apex and so nullify the whole operation, or there may be a small quantity of pus in the pulp-cavity which will form gas. The punctures will allow the gas to escape without injury to the peridental membrane. In answer to remarks from Dr. Clapp, who assumed that Dr. Harlan had said he destroyed more pulps than he found already destroyed, Dr. Harlan said that this statement was not in the paper. The reason that we have so many teeth with dead pulps to fill is because many dentists destroy pulps without filling the tooth, or else fill it so imperfectly that the more able dentists, like Dr. Clapp, have the work to do over again. Replying to a question of Dr. Evans whether the alcohol used would not coagulate the tissues, he said that the paper plainly said alcohol in excess. Alcohol does coagulate albumen, but the coagulum is dissolved in the excess of alcohol added. The ideal method of extracting a pulp would be to extract it while it is entirely alive, but we have no agent for pulp-extraction that will not at the same time close the apical foramen with coagulum. It is a fallacy to think that this will insure a quiet future. We all know there are two classes of organisms which operate to destroy a dead body, one of which lives only in the presence of air, the other living without access to the atmosphere. Now, if you have left a coagulated body in the root of a tooth, you do not know that you have not left a nest or even a few straggling individuals of amœbous organisms which will cause trouble, therefore it is not quite safe to use in the operation any agent which will coagulate albumen.

Evening Session.

The convention was called to order at 7.30, Dr. C. W. Clement in the chair.

The committee appointed to consider the action of the Census Bureau in classifying dentists as manufacturers reported a resolution protesting against such classification, which report was accepted.

Dr. R. R. Andrews read the following paper, which was illustrated by photo-micrographs, and was entitled—

THE DEVELOPMENT OF ENAMEL.

MR. PRESIDENT, LADIES AND GENTLEMEN: In 1888 I had the honor to read a paper before the Odontological Society of Pennsylvania on "The Development of the Dentine." In that paper I called special attention to the formation of that peculiar layer which is everywhere found between what was fully calcified dentine and the pulp-tissue from which it is formed. It is found in teeth that have been decalcified by the action of weak acid. This tissue, which is hyaline in appearance, was, I stated, formed from minute globular bodies that were seen to be in the odontoblasts; they have the appearance of fat-globules, but are not fat. They are also seen on the surface of the layer, where, by coalescing or merging into each other, they form large globular masses, and these coalescing form the layer of tissue to which Professor Harting has given the name calco-globulin. It is by further impregnation of lime to become the fully calcified basis-substance.

I have so far modified my views since reading that paper as to now believe that the odontoblasts, in forming the matrix of the dentine, are only concerned in giving out minute globular bodies, which form the layer of calco-globulin, not being themselves any part of the matrix. I still hold that the fibers within the tubes are formed from a separate cell deeper in the pulp-tissue, whose processes pass in through the protoplasmic mass of the odontoblasts and thence into the dentinal tubules of the formed dentine, or, in other words, that the basis-substance is formed by a deposit of minute globular bodies, and not by a direct change of the protoplasm of the cells.

This subject proved so interesting to me that I turned my attention to the investigation of the formation and calcification of enamel. My specimens were freshly prepared to show the tissue as near life as possible. My method is somewhat different from those used heretofore. I take the forming teeth from the jaws at or nearly at the time of birth, while the tissue is still warm and moist. They are then placed in one-half of one per cent. solution of chromic acid, and this I change three times daily for three or four days. The edges of the calcified tissue are then found to be sufficiently softened to make a number of thin sections; I first wash the teeth in distilled water, and then place them in a solution of gum-arabic for several hours. Alcohol is used to take out the water, and they are imbedded in a preparation of paraffine and lard, which has been poured into a convenient mold, and they are, when cool, ready for section-cutting.

The microtome which I use has this advantage over others; the tissue and knife are both under fluid when the sections are cut, and as they are cut they float off and remain in the fluid until they are taken up for examination. I cut until the tissue which has not been decalcified is reached, and each cutting ruins the edge of my knife; but I have the satisfaction of working as near life as I can with my present knowledge. After cutting, the sections are examined, and those which I think are worth keeping are placed in distilled water for a short time to dissolve out the gum, and then are mounted in glycerine jelly. By this simple method I avoid shrinking or shriveling the tissues, as when they are kept a long time in acids, in absolute alcohol, oil of cloves, or other reagents, or by the drying processes that prepare them for the beautiful serial sections that are turned out from many of our laboratories, where the Thoma microtome is used.

I regard the generally accepted theory of the conversion of the cells of the internal epithelium of the enamel-organ, the ameloblasts, into the rods or fibers of the enamel, as an erroneous one, from the fact that I have often observed in developing teeth a folding in upon itself of that tissue which is to become enamel, which is found between the formed dentine and the cells of the internal epithelium of the enamel-organ. This folded layer is undoubtedly a band of uncalcified tissue, and seems to be formed in these folds, that it may be taken up by the dentine-germ during its rapid growth.

I have quite a number of specimens showing the folding in of this tissue, mostly from pigs' embryos at birth, and this appearance is so marked that it is impossible for me to give any other interpretation.

This peculiar layer has received attention from most of the investigators. Professor Huxley has stated that it is impossible to raise a continual sheet of tissue or membrane from the surface of developing enamel. He concludes that this is the original membrana præformativa of the older writers, and that it eventually becomes Nasmyth's membrane. He believes that the enamel was developed without any direct action of the enamel-organ, because a membrane separated the two. Tomes believes that this sheet or membrane is produced solely by the destructive action of reagents. Markeson believed that it was nothing more than the part of the papilla first calcified.

Dr. Lionel Beale denied the existence of any membrane between the enamel and the enamel-cells. Robin and Magitot offer an explanation of the appearance of such a membrane by stating that the formative pulp is rich in a clear substance of gelatinous consistence; that it is dense toward the surface, where it forms a matrix for the ameloblasts and projects beyond them, so as to look in sections like a sort of varnish, between the enamel and the cells. Being dense near the surface, it may become corrugated and look like a folded or torn membrane.

Frey states that as the calcification of dentine is commencing, the surface of the latter is covered with already hardened, but still short, prisms. Not seldom we encounter appearances as if over these prisms there was superimposed a special cuticle, the so-called membrana præformativa. Such a membrane does not in reality exist, however, and the whole is only a deceptive appearance produced by the youngest layer of enamel which is undergoing development, after the decalcification of the whole from the fully-formed tissue beneath.

Klein says that the distal extremity of the enamel-cells—that is, the one next the dentine—elongates, and this elongation he calls an increment, and tells us that this is directly converted into enamel. He states that the increment of the enamel-cells and the conversion into enamel probably occur successively, and this he thinks to be the cause of the striations across the enamel-rods. He states that the enamel-cells, like all epithelial cells, are separated from one another by a homogeneous interstitial substance, and as he finds this substance between newly-formed enamel-rods, he claims that it is by conversion that one is formed from the other. He says that in the enamel of a developing tooth this interstitial substance is always found to be larger in amount than in the fully-formed organ, and this appearance I have repeatedly noticed myself.

Dr. Sudduth, in his article on Amelification, in the "American System of Dentistry," gives very little if any attention to the existence of this layer found between the calcified and the organic tissue. He speaks of the substance found between the rods of young enamel as a basis-substance composed of calco-globulin ; he calls attention to an important fact which I myself have noticed, and that is, that wherever enamel is forming the stellate reticulum has disappeared, and the stratum intermedium seems directly in contact with the capillaries of the connective tissue without. It seems essential that capillary vessels should thus be in indirect contact with enamel-cells before the processes of calcification can be commenced. Dr. Sudduth gives not a little space in his chapter on Amelification to prove that the enamel, which he rightly calls a coat of mail, and shell, are analogous structures.

There has very recently fallen into my hands an article by Dr. Graf Spee, translated by a friend from the *Biologisches Centralblatt*, "On the First Processes of the Deposition of the Enamel." In it he calls the minute spherical bodies, which I call calcospherites, "enamel-drops." I will quote a part of his most interesting paper :

"A coarsely granular appearance of the enamel-forming cell has been often observed. Annel rightly claims to have seen highly refractive granules in the body of the cells, and, according to my experience, these granules are regularly to be found in enamel-forming cells. The abundant appearance of the granules at the time of the formation of the enamel, and their entire absence at earlier stages, is an indication that the granules are an enamel-substance. I call them enamel-drops. Following up their future confirms their appearance. I saw the enamel-drops appear only in the half of the enamel-cells which is turned toward the pulp, and within this half at first in the end which rests on the dentine ; afterward farther up in the cell, but not quite up to the region of its nucleus. Many of them were so small as to be scarcely measurable. They are almost always spherical.

"Great numbers of them are collected at the periphery, and appear here either to be completely arranged or to fuse together. At any rate, one soon finds that on the dentine or on the already formed enamel-layer there are no longer isolated or enamel-drops, but a more homogeneous mass. The lower part of the cell contains the larger enamel-drops, which merge without sharp boundaries into the substance of the enamel-fibers. This then appears as a part of the enamel-cell in which the originally isolated enamel-drops have run together into a continuous mass. The growth of the enamel-rod, once begun, appears to take place by the addition of new enamel-drops.

"The product of the enamel-cells first to be found is therefore not the chemically definite enamel, but an organic precursor of it which is perhaps horn-like, since even the enamel-cap, which is not yet impregnated with salts, has a horny appearance. When there is a formation of earthy deposits under the influence of cells, the process is of such a nature that at first an organic production is formed, which in turn has the power of easily forming insoluble compounds with organic salts, and thus become hardened."

This "horn-like" substance which Dr. Graf Spee found was, I believe, the changed tissue calco-globulin to which I have already alluded.

It may not be uninteresting at this point to quote from Quain's Anatomy, vol. ii, p. 71, a few words about other tissues formed from globules. In speaking of the formation of elastic fibers the writer says, "These, as shown by Ranvier, first appear in the form of granules or globules, which subsequently become fused together end to end, and are not at any time connected with cells. In elastic cartilage the granules or globules make their appearance, it is true, in the immediate neighborhood of the cartilage-cells, but although this renders it probable that the deposition of the globules is influenced by the cells, it does not prove that they are formed by a direct conversion of the cell-protoplasm. Indeed, the subsequent extension of these fibers into those parts of the matrix which were previously clear of them, and in which no such direct conversion of cell-protoplasm seems possible, is a strong argument in favor of the deposition hypothesis. The view which supposes that a direct conversion of the protoplasm of the connective-tissue cells takes place into fibers both white and elastic has of late years been widely adopted, but it seems to rest less upon observation than upon a desire to interpret the facts in accordance with the conceptions of Beale and M. Schultze, according to which every part of an organized body consists either of protoplasm (formative matter) or of material which has been protoplasm (formed material), and the idea of a deposition or change occurring outside the cells in the intercellular substance is excluded. But it is not difficult to show that a formation of fibers may occur in soft substances in the animal organism, independently of the direct agency of cells, although the materials for such formation may be furnished by cells. Thus, in those calenterate animals in which a low form of connective tissue first makes its appearance this is distinguished by a total absence of cellular elements, the ground substance being first developed and fibers becoming formed on it. Again, the fibers of the shell membrane of the bird's egg are certainly not formed by the direct conversion of the protoplasm of the cells, although it is probable it is in matter secreted by those cells, and through their agency, that the deposit occurs in a fibrous form."

To the dental histologist enamel is, perhaps, the most difficult subject he is called upon to investigate. While there are many who have shown us the coarser morphology of the enamel-organ, there are very few who have had anything to say about the finer processes in the deposition of the enamel. Perhaps on account of the difficulties met with, the subject has received insufficient investigation. The ordinary methods of the laboratories do not give us good results with this tissue. It comes to us so shrunken as to be of little use in satisfactorily demonstrating what the minute bodies, miscalled granules, within the substance of the enamel-cells really are. The shrinking of the cells is caused by the reagents which have been used in their preparation.

The so-called calcareous granules are minute calcospherites,—they are mostly spherical. (The nucleus of the enamel-cell is not always to be found farthest from the calcifying tissue, as authorities inform us. I have sections showing it midway between the two ends of the cell, some being nearer the layer next the forming enamel, surrounded by very many minute glistening bodies.) Between the cells and the calcified material is found the layer of calco-globulin. It is of the utmost significance to us, because within its substance the first formation of the rods of the enamel takes place. Huxley was right in his estimate of its importance, but wrong in calling it a membrane.

It is a tissue formed by the globular contents of the enamel-cells, with a portion of the cell-protoplasm, a cement substance. In it the globules are arranged in columns and become the rods. This is the point I would emphasize, showing, as I believe it does, the methods of nature in forming rods, independent of the cells themselves. By a further process, these globules or masses become calcified, and a part of the already calcified rods. I have studied this layer from several hundred sections, in studying the formation of dentine, as well as of the enamel.

In the dentine we have a formative pulp, full of nerve-bundles, fibers, and capillaries, and as a consequence its calcification gives us a matrix full of organic tissue. In the enamel-organ there is an almost entire absence of vessels. Its calcification gives us a matrix almost without organic tissue. Enamel in this early stage presents the best possible condition to note the presence of a reticulum of living matter if any were present; but with the best objectives at my command, and with all the care that I could give to the subject, I have failed to find the appearance of anything of the kind.

In teasing off portions of the layer with needles, I have found the uncovered calcified matrix to have everywhere over its surface myriads of globular forms, of various sizes, resting in a semi-fluid, the so-called protoplasmic substance. The cells of the internal epithelium of the enamel-organ at the time when calcification is commencing are, if they have been carefully prepared as I have already said, found to be full of these minute globules which I believe to be calcospherites. These are given out from the cell into the layer continually, forming, by coalescing, larger globules or masses which will become the rods, and are surrounded by this protoplasmic substance, which is to be the cement-substance between the rods; the cells of the stratum intermedium above are seen to be in direct contact with the embryonic connective tissue, the stellate reticulum having disappeared from that part.

My sections having been made extremely thin, were not stained, and the photographs may not show with all the clearness I could wish, but I believe they will give an outline, at least, of what I have referred to. Some of the sections illustrate my point so clearly as to be almost diagrammatic; other sections will show that the protoplasmic substance in which the globules or masses are to be seen is forming the cement-substance between the young rods. Tissues showing these various transitions are mostly from the tooth of the calf at birth, some from human embryos, fifth month, and others from pigs at birth. In making sections of tissue which is only partially decalcified, I have been able to obtain some pictures of young enamel almost as we see it in ground sections. In the rods of these sections it is possible to mark out the outlines of the globules or masses from which I believe they are formed.

These globules themselves, before complete decalcification has taken place, consist of that substance that Professor Harting has called calcoglobulin. I do not think that the substance between the rods, is to be considered this tissue, although Professor Sudduth, in his article on Amelification, gives it this name, which should be applied only to the tissues that are formed from the globules. It may be of interest in connection with this subject to repeat here a very brief description of the experiments of Professor Harting and Mr. Rainie on the action of certain lime-salts on albumen. These investigators claim that the experiments give us an explanation of the methods of the calcifying processes of the osseous tissues.

Mr. Rainie found that if carbonate of lime be slowly added to a thick solution of albumen, the resultant salt is in the form of globules laminated in structure like tiny onions ; the globules in contact become agglomerated into a single laminated mass, appearing as if the laminæ in immediate apposition were blended with one another. The globular masses, at one time of mulberry-like form, lose the individuality of their constituent smaller globules, and become smoothed down into a single mass. Mr. Rainie suggests, as an explanation of the laminated structure, that the smaller masses have accumulated into concentric layers which have subsequently coalesced, and in the substitution of the globular for the crystalline form in the salt of lime when in contact with albumen he claims to find a satisfactory explanation of the development of bone, teeth, and shells.

Professor Harting has shown that the albumen left behind, after the treatment of these globules with acid, is no longer ordinary albumen. It is profoundly modified, and has become exceedingly resistant to the action of acids, resembling chitine, the substance of which the hard skins of insects consist, rather than any other body. The small and onion-shaped globular bodies he has named calcospherites, and the layer caused by the coalescing of these, calco-globulin, as it appears that the lime is held in some sort of chemical combination ; for the last traces of lime are retained very obstinately when calco-globulin is submitted to the action of acids, in the same manner as does that layer which is found everywhere on the borderland of calcification between the fully calcified and the formative tissues.

In conclusion, I believe :

(1) That the cells of the internal epithelium of the enamel-organ, the ameloblasts, contain in the part nearest the calcifying tissue large numbers of minute glistening bodies which have been misnamed granules, but which are really calcospherites.

(2) That these minute globules are given out from the enamel-cell into a protoplasmic substance which is on the surface of the first formed layer of dentine or on the forming enamel ; that they here coalesce and form larger globules or irregular-shaped masses.

(3) That in this condition they form a layer of calco-globulin. The globules or masses are arranged in columns, independent of the enamel-cell.

(4) That this layer is really that which the older writers called the membrana præformativa.

(5) That the forming rods in this layer calcify and become part of

those already calcified, the so-called protoplasmic substance surrounding them becoming the cement-substance, as before stated.

Discussion.

Dr. Peirce said the illustrations of the forming enamel were the most satisfactory of anything he had ever seen. He thought his New York friends must have mistaken the globules which united to form the enamel-rods for reticulum. The question of nourishment during the progress of the development of the enamel was whether it was derived from the stellate structure or from the circulation.

Dr. Andrews thought the nourishment came from the blood.

Dr. G. F. Waters said that in certain diseases there was an acid condition of the blood and an arrest of the formation of tooth-structure. Such a condition is found in children suffering with scarlet fever or any of the zymotic diseases. This arrest of development in such cases seems to prove that the nourishment depends upon the blood. In extreme cases the arrest of development is so complete that the teeth have no enamel at all.

Dr. W. P. Cooke read a paper entitled

FORMATIONS IN THE PULP-CAVITY.*

Deposits in the pulp-chamber have long been recognized. They were alluded to in 1780, in 1835, and by Tomes in 1846.

These formations may be classified as follows:

1. Secondary dentine,—normal.
2. Nodules attached to the wall of the pulp-cavity.
3. Nodules loose in the pulp-cavity.
4. Calcifications, loose, easily distinguished from the others by their white, chalky appearance.

The fact that dentine is deposited by the pulp as the teeth are worn down was recognized by Dr. John Hunter in 1800. The tubuli are continuous with the normal dentine, and have a similarity of arrangement in the dentine of repair, but in the loose and nodular formation there is no similarity of direction.

Etiology.—The cause may be traumatic or idiopathic. They were believed by Mr. Hulme to be caused by irritation set up by decay, the deposit forming as long as the irritation is kept up.

The cause may be similar to that which causes ligament to be changed to cartilage, cartilage to bone, the deposit in the coats of the arteries, the ossification of the cartilage of the ribs, and deposits in the brain. In some cases it may result from age, in others from constitutional tendency. Syphilis and gout cause nodes in bones, and may possibly occasion these formations in the teeth. When these deposits occur there is an increased supply of blood, so any cause which produces an increase of blood-supply may favor the deposit.

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*This paper was illustrated by sixty photographs of teeth with the pulp-cavity partially or entirely filled with the new growth.

Caries, recession of the gums, or absorption of the alveolar process, by which means the pulp is more exposed to heat and cold; large metallic fillings, lack of occluding teeth, undue impact in occlusion, and irritation by clasp, may be exciting causes. Wedl thinks that while many teeth in old age have these formations, yet as all do not have them the cause must be sought in abnormal processes not accompanied by pain. Chronic pericementitis may be a cause; if on one root only, the deposit will be confined to that root.

Effects.—The effect of these deposits varies, and is not always recognized; severe neuralgia is sometimes traceable to this source. In some cases the patient may have sharp, lancinating pains; the teeth sensitive to thermal changes, also to the excavator; itching and slight uneasiness about the tooth, or a continuous boring pain in it; sensitiveness of the enamel on scratching it with the finger-nail; slight external inflammation of the gum, and slight soreness on percussion. Wedl thinks that pain is not produced by calcifications until they are quite large. Cases are on record where several teeth have been removed at different times for the same patient for the relief of neuralgia, and in each instance the deposit found was supposed to be the cause. If in such cases extraction is resorted to, it is advised to first allay the pain, as neuralgia will be less likely to ensue.

These deposits may have an important bearing in relation to pulp-capping. Some claim that when the layer of odontoblasts have been destroyed no new deposit of dentine can take place, but most writers are agreed that in a healthy pulp calcification will take place at the point of exposure.

Form and Location.—These deposits vary from a small speck, scarcely visible without a glass, to those that nearly fill the pulp-cavity. They are surrounded by a delicate membrane which prevents their uniting with the wall of the pulp-chamber. This accounts for the difficulty we have in devitalizing such teeth, the application acting on a small portion of the membrane only. A touch upon the deposit causes pain by producing pressure on the live tissue on the other side of the deposit.

The calcifications are found in the bundles of connective tissue and the sheaths of the blood-vessels. Salter thinks the calcification begins at different points and coalesces into one mass; he also thinks the new deposit is finally fused and blended with the dentine. If this were so we would find the whole pulp-cavity filled, which we rarely, if ever, do. Many times the deposit is found at the mouth of the root-canal, and must be removed before the canal can be entered. When the deposit is loose this is comparatively easy, but when the canal is covered by one of these growths that project from the wall of the pulp-chamber, especially from the point of bifurcation of the roots, it is not very clear which way we must cut to reach the canal. In a case in point, the deposit was drilled three-quarters through and then the pulp-chamber and remaining canals were filled ; subsequent trouble caused the removal of the tooth, when it became evident that the difficulty might have been avoided by drilling a little farther. The largest deposits I have found in the molars, teeth which had probably stood the shock of mastication for years,—dark yellow teeth, many of which had evidently been lost by Riggs's disease. With a little experience we may select from a number of teeth such as have deposits in them,—dark yellow dentine deposits, not the calcification which appears in much younger teeth.

In one case, a lower wisdom-tooth, in which the decay had probably been rapid, and had progressed till the pulp was exposed, the whole of the pulp-chamber was filled with a white deposit, that was loose and had a membrane between it and the wall. In the cuspids the apex of the pulp is most frequently ossified, but in many of them we find small, round nodules in the substance of the pulp ; several of these may be present. They are frequently found directly under a filling, as though caused by it, though they may have been there before it was inserted.

The safe course in the treatment of devitalized teeth is to open well into the pulp-chamber, and by this means obtain access into the canals. In the majority of cases I think no trouble arises primarily from these deposits.

Frequency.—Salter claimed that the pulp of every tooth became more or less ossified, also that it occurs oftener in the roots. Some claim it occurs oftener in young persons, and in deciduous more than in permanent teeth. I do not find this to be the case, but rather the reverse. It undoubtedly occurs more in chronic than in acute caries.

These deposits are not confined to human teeth, as similar deposits are found in the teeth of deer, hare, pigs, and the walrus. They have no relation to exostosis. In the DENTAL COSMOS, vol. v, p. 36 (1863), is the record of ten thousand teeth examined for exostosis, with the following results :

Carious teeth, 6200 ; exostosed, 319 = 5 per cent.
Sound teeth, 3000 ; exostosed, 85 = 4 per cent.
Average exostosed, 4 per cent.

1. Molars, in 4000, 210 exostosed = 5 per cent.
2. Bicuspids, 2000, 94 exostosed = 4 per cent.
3. Incisors and cuspids, in 250, 10 exostosed = 4 per cent.

Exostosis occurs with greatest frequency in molars, and is believed to be caused by a constant, though slight, irritation to the pulp. In this respect these deposits resemble it.

Some five years ago I commenced a series of investigations to determine the frequency of these deposits in human teeth. I have examined teeth collected in three different parts of the State, and with the same results. The teeth being dry, were cracked upon a small anvil, and the contents of the pulp-chamber examined by a strong glass. Accurate records were kept as to soundness, decay, etc., with the following results:

Incisors:

Carious,	521;	deposit,	28 = 5 %.
Sound,	179;	"	11 = 5 %.
Total,	700;	"	39 = 5 %.

Bicuspids:

Carious,	539;	deposit,	29 = 5 %.
Sound,	161;	"	7 = 4 %.
Total,	700;	"	36 = 5 %.

Cuspids:

Carious,	140;	deposit,	10 = 9 %.
Sound,	160;	"	31 = 19 %.
Total,	300;	"	41 = 13 %.

Superior molars:

Carious,	1054;	deposit,	293 = 27 %.
Sound,	551;	"	191 = 34 %.
Total,	1605;	"	484 = 30 %.

Inferior molars:

Carious,	1089;	deposit,	297 = 27 %.
Sound,	606;	"	145 = 23 %.
Total,	1695;	"	442 = 26 %.

Totals:

Incisors,	700;	deposit,	39 = 5 %.
Bicuspids,	700;	"	36 = 5 %.
Cuspids,	300;	"	41 = 13 %.
Molars,	3300;	"	926 = 28 %.
	5000;	"	1042

Discussion.

Dr. Peirce regretted that it was not possible to learn the history of some of these cases, as that would probably throw some light upon the cause of the growths, and perhaps would enable us to diagnose their presence and thus explain the cause of many facial neuralgias.

Dr. Waters mentioned a case in his practice where a tooth split open with a sudden report, and the cavity was found filled with a hard deposit which no doubt had effected the violent disruption of the tooth.

Dr. W. G. A. Bonwill illustrated by a series of diagrams the laws which should govern the construction of artificial dentures.

Clinics.

The clinics were held at 9.30 A.M. on Friday, October 31.

Dr. George C. Ainsworth exhibited a case in which he had applied a Logan crown with a gold band. Dr. B. C. Russell inserted a porcelain inlay turned down to fit from a porcelain rod. Dr. W. H. Pomeroy exhibited a case of correction of irregularity. Dr. R. H. Upham exhibited an artificial nose and ear.

Adjourned.

AMERICAN ACADEMY OF DENTAL SCIENCE.

THE twenty-third annual meeting of the American Academy of Dental Science was held at Young's Hotel, Boston, Mass., on Wednesday, November 12, 1890; President F. N. Seabury, of Providence, R. I., in the chair.

The reports of the corresponding secretary and the treasurer showed the society to be in a very prosperous condition. Seven new members had been admitted during the past year.

The following officers were elected for the ensuing year: F. N. Seabury, of Providence, president; C. A. Brackett, of Newport, R. I., vice-president; Edward N. Harris, of Boston, corresponding secretary; Charles H. Taft, of Cambridge, recording secretary; V. C. Pond, of Boston, treasurer; Edward C. Briggs, of Boston, librarian; Eugene H. Smith, Thomas Fillebrown, and F. E. Banfield, of Boston, executive committee.

Resolutions of respect to the memory of members who had died during the year were adopted.

The annual address was delivered by W. H. H. Thackston, M.D., D.D.S., of Farmville, Va., and he chose for the subject of his oration, "American Dentistry."

Charles H. Taft, A.B., D.M.D., of Cambridge, delivered an address on "The Progress of Science and its Influence on Modern Civilization."

Votes of thanks were given Drs. Thackston and Taft, and copies of each address were requested for publication in pamphlet form.

Adjourned at six o'clock, to partake of the anniversary dinner. The party broke up at ten o'clock with many expressions of pleasure.

EDWARD N. HARRIS, D.D.S., *Corresponding Secretary*,
No. 2 Park Square, Boston.

NEW ENGLAND DENTAL SOCIETY.

AT the union meeting held in Boston in October last the New England Dental Society elected the following officers:

W. E. Page, D.M.D., Boston, Mass., president; J. F. Adams, D.D.S., Worcester, Mass., first vice-president; S. G. Stevens, D.D.S., Boston, Mass., second vice-president; Edgar O. Kinsman, D.D.S., Cambridge, Mass., secretary; J. H. McQuade, D.D.S., Medford, Mass., assistant secretary; G. A. Young, D.D.S., Concord, N. H., treasurer; A. H. Gilson, D.D.S., Boston, Mass., librarian. Executive Committee, C. W. Clement, D.D.S., Manchester, N. H.; George F. Cheney, D.D.S., St. Johnsbury, Vt.; J. E. Quinn, D.D.S., and J. H. Daly, D.D.S., Boston, Mass.

EDGAR O. KINSMAN, D.D.S., *Secretary*,
No. 15 Brattle Square, Cambridge, Mass.

NEW YORK ODONTOLOGICAL SOCIETY.

At the annual meeting of the New York Odontological Society, held at the New York Academy of Medicine, No. 17 West Forty-third street, Tuesday evening, December 16, 1890, the following officers were elected for the year 1891 :

Dr. William H. Dwinelle, president ; Dr. Albert H. Brockway, vice-president ; Dr. Charles Miller, treasurer ; Dr. F. A. Remington, recording secretary ; Dr. George A. Wilson, corresponding secretary ; Dr. Z. T. Sailer, curator.

These officers, together with an Executive Committee and editor (to be chosen by the above-named officers), will constitute the Council of the society.

ODONTOGRAPHIC SOCIETY OF CHICAGO.

At the annual meeting of the Odontographic Society of Chicago, held December 8, 1890, the following officers were elected for the ensuing year :

D. C. Bacon, president ; H. R. Sackett, vice-president ; R. B. Tuller, recording secretary ; T. A. Broadbent, corresponding secretary, and E. Noyes, treasurer.

T. A. Broadbent, *Corresponding Secretary*,
Chicago, Ill.

RUSSIAN DENTAL ASSOCIATION OF ST. PETERSBURG.

The Russian Dental Association of St. Petersburg held its seventh annual meeting on Friday, the 27th of November, 1890.

The following officers were elected for the ensuing year : Wassili Pravedny, president ; Dr. N. Dagaeff, vice-president ; Dr. Alexander Limberg, corresponding and recording secretary and reporter ; Samuel Linbeck, treasurer.

Geo. Berger, M.D., D.D.S.

DENTAL PROTECTIVE ASSOCIATION OF THE UNITED STATES.

The second annual meeting of the Dental Protective Association of the United States was held at the Grand Pacific Hotel, Chicago, Dec. 16, 1890. The president, Dr. Crouse, called the meeting to order and spoke as follows :

"Our second year closes full of encouragement. Last year at our first annual meeting we had represented, in person and by proxy, six hundred and forty-eight members. This, our second annual meeting, is represented by nearly fifteen hundred members, showing that the membership has more than doubled during the year.

"We have driven the Tooth Crown Company from Milwaukee, where they had commenced suits against five members. Our attorneys entered a motion asking the court to set and limit the time when all the testimony should be presented by the Crown Company. After hearing the arguments of the counsel on both sides, the court limited the time to twenty days, and before it was up the Tooth Crown Company withdrew all the suits at their own cost. A similar move in Baltimore, where six of our members had been sued and we had taken charge of their cases, caused the Crown Company to withdraw all these suits at their own cost. This demonstrates the correctness of what we have all along claimed, that the International Tooth Crown Company did not dare to enter into a fair contest as to the validity of their patents. They have now commenced three suits in New York, and answers will be filed in due time. We accept licensees on the same terms as others, and afford them the same protection, with the exception of a few located in a very limited portion of the country.

"The Dental Protective Association has been giving absolute protection to the entire dental profession, while, thus far, less than one-tenth of the whole number have joined our association. We want every member of the profession to unite with us. Ten dollars is but a trifle for each dentist to pay for the protection and benefits he receives. Think of fifteen thousand dentists in one association! Who can estimate the great good that such an organization can accomplish? Is it a dream? No! I expect to live to see it. It only depends on the amount of exertion the present fifteen hundred members put forth. Let every member during the year get three new members. It will be an easy way to treble our membership, which is the great work of the coming year. We have saved the dental profession a million of dollars the past year, and, better still, saved many of its members the humiliation of signing a license that robs a man of his manhood.

"I want a committee appointed from this association to examine our books and methods of doing the work."

On motion Drs. Gilmer, Fernandez, and Ames were selected as the committee. The following is their report:

Your committee beg leave to report that after a careful examination of the management and accounts of the Protective Association of the United States, for the year to date, we have come to the conclusion that it is being managed carefully, economically, and with good judgment.

We know positively that the chairman is giving to this work much thought and time, which is the same as money to him; that during the year he has attended several dental meetings in the interest of the association; that he has devoted much time and labor to organizing the profession and in attending to its litigation, and that he has done all this entirely at his own expense and without one dollar of cost to the association.

The entire office expense of the association for the year amounts to two hundred and forty dollars ($240.00), and that for clerical help.

The Protective Association is saving hundreds of thousands of dollars annually to the profession, and we believe it to be the duty of every dentist to assist its grand work by paying the membership fee and becoming identified with the association. It is certainly unjust that a few should bear the entire expense for the benefit of the whole profession, and it is demoralizing to those who quietly accept the fruit of this injustice.

We would further recommend that, as soon as the management think it advisable, after due notice to the profession, the books be closed, and the protection of the association be withheld from non-members.

Thos. L. Gilmer,
E. M. S. Fernandez,
W. B. Ames,
Committee.

The election of a board of directors resulted in J. N. Crouse, T. W. Brophy, and E. D. Swain being elected their own successors.

After some further routine business, the meeting adjourned.

J. N. Crouse, *President.*
E. D. Swain, *Secretary.*

KANSAS CITY DENTAL COLLEGE ALUMNI.

All graduates of the Kansas City Dental College are requested to send their present addresses to the undersigned, for the purpose of the organization of an alumni association.

J. P. Root, Kansas City, Kan.

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EDITORIAL.

SECRET AND PATENTED LOCAL ANESTHETICS.

There is, it would seem, a lively business being carried on in the sale or licensing to use secret or patented anesthetics for the cure of toothache, the relief of sensitive dentine, and the painless extraction of teeth. We are constantly in receipt of inquiries as to what we know of Smith's, Jones's, or Brown's preparations. Occasionally comes an anxious applicant who says that his rival in the village has purchased the exclusive right for that locality, and is drawing all the patronage to himself by bold advertisement of the fact that he only is entitled to employ this last best gift of Heaven to man. "No danger, no disagreeable after-effects, no unconsciousness,—simply an absolute immunity from pain during operation or extraction." Most of these wonderful anesthetics are compounds, the ingredients of which are known only to the compounder; but they are all, first and foremost, perfectly safe and demonstrably efficacious as obtundents of sensibility, whether used for preventing pain in excavating preparatory to filling, for the relief of toothache in exposure of the pulp, by bathing the gums surrounding a tooth previous to the application of the forceps, or by injection into the gum-tissue for like object.

Not being informed as to the composition of these various panaceas, we cannot pronounce as to their efficacy or safety. We can and do, however, reply to inquiries concerning the employment of secret preparations, especially by injection into the tissues, that it would appear to be unprofessional and somewhat risky to inject any agent into the circulation, of the nature and effects of which the administrator was in ignorance.

Other preparations of this class are patented. Five of such patents are now before us.

The first is that of Robert H. Peak, of Orlando, Fla., which is—

> "mainly designed to be used for preventing or relieving the pain in sensitive dentine during the process of preparing the cavity of the tooth for the purpose of filling it; also, as a disinfectant and deodorizer for preventing septic action and lessening the liability to trouble usually following a dental operation. Furthermore, if applied to the cavities of dead teeth and the nerve-canals be thoroughly cleansed with the compound before filling the cavities, it will prevent the formation of alveolar abscess after they are filled by destroying the tendency to generate gases in and at the root of the tooth."

This preparation is composed of liquor ammonii acetatis, half-ounce; salicylic acid, eighty grains; hydrochlorate of cocaine, eight grains.

The second of these patents is that of Alfred L. McCarty, of Des Moines, Ia., the object and composition of which is thus stated:

> "To provide a simple, safe, efficient, and convenient compound specially adapted for use in the practice of dentistry; and my invention consists in compounding the following-named ingredients, in about the proportions specified, to wit: five (5) grains crystallized muriate of cocaine, six (6) drops of chloroform, six (6) drops of extract of staphisagria, three (3) drops of oil of cloves, and three (3) drams of water. These ingredients are thoroughly mixed to produce a volatile fluid that can be readily put in vials, to be therein placed on the market for sale, and readily applied locally and hypodermically for all the purposes for which an anesthetic is adapted."

The third patent is that of Eugene F. Jaques, of Burton, O. The patentee says,—

> "My invention is in the nature of an anesthetic to be applied locally by hypodermic injection, and it is specially designed for use in the extraction of teeth.

"In compounding my anesthetic I take the following ingredients: hydrochloride of cocaine (*Erythroxylon coca*), two grains; carbolic acid (*Acidum carbolicum*), one minim; oil of wintergreen (*Oleum gaultheriæ*), three minims; oil of mustard (*Oleum sinapis*), one minim; alcohol (*Spiritus purificati*), two minims; pulverized boric acid (*Acidum boricum, pulv.*), one grain; distilled water (*Aqua distillati*), forty-nine minims, and oil of cajeput (*Oleum cajeputi*), one minim."

The next in order is the patent of Alfred Clark, of Montpelier, Vt. The composition he says is to be applied "to the gums near the teeth to be extracted, and also injected into the gums from three to seven minutes before beginning the operation of extracting the teeth." He thus describes the compound:

"My composition consists of the following ingredients combined in the proportions stated, viz.: chloride of sodium, two grains; hydrochloride of cocaine, two hundred grains; chloral, one grain; essence of peppermint, one grain, and carbolic acid, one-half grain. The dose for use when teeth are to be extracted must vary with the case in hand, as from two to five minims. The salt in this composition lessens the soreness and swelling of the jaw. The carbolic acid is useful in cleansing any ulcer or abscess and will hold nausea in check. The peppermint, as well as the carbolic acid, will resist this feeling of sea-sickness which cocaine alone might cause. If the cocaine were used alone, it might also cause a swelling of the tissues of the jaw and face. These ingredients are to be thoroughly mingled by agitation."

Now comes the patent of Robert Isaac Hunter, of Norfolk, Va., No. 394,693, December 18, 1888, described as follows:

"My compound is composed of the following ingredients, in the proportions stated: chloral hydrate, six grains; cocaine, five grains; arsenic, ten grains; creosote, twenty drops; carbolic acid, five drops. These substances are put together and three drams of water are added to form a complete solution of the solid matters.

"In practical use, a small pledget of raw cotton is saturated with the above solution and inserted in the cavity to be excavated. The compound will at once act as an obtundent or anodyne on the sensitive dentine composing the body of the tooth, and in a short time—ranging from five to fifteen minutes—it will produce complete insensibility of the nerves distributed through the dentine, so that the patient will experience no pain during the subsequent operation of excavating the cavity by means of suitable instruments."

Dr. Hunter repeats his formula in his claim, as follows:

"What I claim is—

"The improved dental obtundent or anodyne hereinbefore described, composed of chloral, six grains; cocaine, five grains; arsenic, ten grains; creosote, twenty drops; and carbolic acid, five drops, substantially as specified."

This was the obtundent shown by Dr. Hunter before the First District Dental Society of New York at the November meeting, and to which Dr. W. H. Atkinson referred when speaking of a case of ranula upon which he had just operated. He is thus reported: "If the discharge from the root-socket is resumed, he recommends anesthetizing the parts with some compound of cocaine, Dr. Hunter's obtundent for instance, opening down to the alveolar process and removing with a bur the rough or necrosed portion of bone."

In a circular accompanying the package of "The Latest Improved Dental Anodyne," Dr. Hunter says, "This preparation is not used by dentists alone, but can be used by anyone, as it is a useful article in every household. Mothers should not be without it, as they can stop the little ones' teeth from aching in a few minutes. This anodyne has the advantage over all others, as it does not make the mouth sore. You can use as much as you like with no bad results. It is perfectly harmless."

Recurring now to the formula, we find there are ten grains of arsenic in three fluidrachms and twenty-five drops,—practically (not allowing for a gradually increasing strength by the evaporation of the water) one grain of arsenic to twenty drops of the liquid. Is this a proper compound to be employed to allay sensitiveness of dentine over a living pulp? Is this a safe compound to be put into the hands of mothers for use in the mouths of their children? Is this a compound entitled to the indorsements of prominent dental practitioners as a "satisfactory *anodyne*"? If so, our chemistry and therapeutics are at fault. If the indorsements we have seen were given with a knowledge of the constituents of the "anodyne," we marvel; if they were given without such knowledge, there is no necessity for comment.

Moreover, this "anodyne" is dispensed in plain half-ounce white glass bottles, without label of any description. Not one of the usual precautions to warn against mistake has been adopted: such as blue glass, a fluted bottle, or a label of "Caution," "Poison," "Not to be swallowed," "Use with great care," or anything of the sort.

It would seem that the following provision of the Pennsylvania law as to labeling poisons is not strictly complied with in this case:

> "No apothecary, druggist, or other person, shall sell or dispose of, by retail, any morphia, strychnia, arsenic, prussic acid or corrosive sublimate, except upon the prescription of a physician, or on the personal application of some respectable inhabitant of full age, of the town or place in which such sale shall be made; and in all cases of such sale, the word poison shall be carefully and legibly marked or placed upon the label, package, bottle, or other vessel or thing in which such poison is contained; and when sold or disposed of, otherwise than under the prescription of a physician, the apothecary, druggist, or other person, selling or disposing of the same, shall note in a register kept for that purpose, the name and residence of the person to whom such sale was made, the quantity sold, and the date of such sale; any person offending herein shall be guilty of a misdemeanor, and on conviction, be sentenced to pay a fine not exceeding fifty dollars."—*1 Purdon's Digest*, 335.

Of course if any cautionary label were affixed to the bottle it would seem to be in contradiction to the language of the circular,—"You can use as much as you like with no bad results. It is perfectly harmless."

We respectfully suggest that the indorsement of such a preparation, either with or without a knowledge of its components, by dental practitioners, is a question in ethics which it would do no harm to discuss.

SECTION III, A. D. A.

Dr. A. W. McCandless, Davenport, Iowa, requests us to give notice that as chairman of the special committee of the above Section on Dental Art and Mechanism, he desires the co-operation of the profession in bringing before the association and also before the Iowa State Dental Society any new appliances and methods of practical value in operative dentistry.

BIBLIOGRAPHICAL.

Pearson's Dentist's Appointment-Book, for the Vest-Pocket.

The regular annual appearance of this little appointment-book shows that its convenience as a vest-pocket companion for a brief record of daily practice is being appreciated by the profession. Its price is only 50 cents, and 75 cents with name in gilt on cover. Published by R. I. Pearson & Co., Kansas City, Mo.

Dental-Kalender für Deutschland, Oesterreich-Ungarn und die Schweiz, 1891. IV. Jahrgang, Theil II. Enthaltend die Personalien und statistischen Nachweise, etc. Berlin: Dr. Erich Richter, Chausseestr. 1*a*. Preis für beide Bande, 3 mk. 50 pfg.

This valuable calendar has been published for several years, and made itself quite a necessity to the dental profession of Germany and adjacent countries. Its title sufficiently indicates its scope and purpose.

OBITUARY.

DR. JOSEPH RICHARDSON.

Died, at Terre Haute, Ind., August 30, 1889, of Bright's disease, Joseph Richardson, D.D.S., M.D., in the sixty-sixth year of his age.

Dr. Richardson was born at New Lisbon, O., April 26, 1824. He received a classical education in early life; studied medicine in the Ohio Medical College, and dentistry under the tutorship of Dr. James Taylor, of Cincinnati. In 1853 he graduated at the Ohio College of

Dental Surgery, and began the practice of dentistry at Cincinnati in the same year, removing to Terre Haute, Ind., in 1862. He filled the chair of mechanical dentistry in the Ohio Dental College for about four years, continuing his study of medicine meanwhile, and graduating at the Miami Medical College in 1854. In 1859 he entered the Ohio Medical College, graduating in medicine from that institution.

In 1860 Dr. Richardson published the first edition of his "Practical Treatise on Mechanical Dentistry," which has passed through four editions, and been adopted in all the dental colleges as a textbook, and is to-day recognized as the most complete treatise on the subject which has yet appeared. It has been translated into the German language.

He was a member of the American Dental Association, of the Mississippi Valley Dental Association, and of the Indiana Dental Association. On the organization of the Indiana Dental College he was appointed to the chair of prosthetic dentistry.

Dr. Richardson married, in 1854, at Cincinnati, Anna M. Wise, who with two children, a son and daughter, survive him.

Dr. Richardson held other positions of responsibility and trust, and secured the respect and confidence of his fellow-citizens to a large extent. His integrity was unquestioned, and his kindly and genial manners endeared him to a large circle of friends.

We deeply regret that owing to some unaccountable oversight this notice was not sooner inserted.

DR. GUSTAVUS A. GERRY.

RESOLUTIONS on the death of GUSTAVUS A. GERRY, D.D.S., of Lowell, Mass., whose obituary appeared in our December (1890) number, were passed at the union meeting in Boston in October last by the following societies:

By the Massachusetts Dental Society, reciting that he had been an active and honorable member of the society for many years, and sometime its president; that they deplored his early loss; that he was a man of eminently good qualities and integrity of character in his professional relations and in all the walks of life; and extending sympathy to his bereaved family. The resolutions were signed by a committee consisting of Drs. W. E. Page, Joseph King Knight, and S. G. Stevens.

By the New England Dental Society, mourning Dr. Gerry's loss as that of a beloved brother, co-worker, companion, and friend, whose many graces of character made his life one of usefulness and honor; who was the founder of the society; whose record was marked with fidelity, uprightness, and sincerity, and whose faithfulness and earnest work was known throughout the profession. The resolutions were ordered to be placed upon the records of the society, and a copy sent to the afflicted family. They were signed by a committee consisting of Drs. C. A. Brackett, A. H. Gilson, and R. R. Andrews.

HINTS AND QUERIES.*

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The following letter from Prof. Miller containing the notes of a case of actinomycosis hominis which was referred to by him in his remarks at the banquet in Philadelphia given in his honor, possesses features of such general interest and importance that I take the liberty of sending it to you for publication, in order that it may reach the profession at large.

Yours truly, EDWARD C. KIRK.

"DEAR DR. KIRK:

"Agreeable to my promise, I send you a few notes relating to the case of actinomycosis hominis to which I referred while I was in your city.

"The case was observed by James Israel, and published in the *Archiv für Klin. Chirurgie*, Band xxxiv, 1886, Heft I, p. 160. It related to a driver, aged twenty-six, who was in the habit of sleeping on the straw or in the hay-mow, and often drank out of the same trough with his horse. Israel found the ray fungus in the secretion of the abscesses and ulcers which covered the left side of the man's breast, but was not able to discover the primary seat of the infection until after the patient's death. The autopsy revealed an actinomycotic cavern in the anterior portion of the superior lobe of the left lung; from here it extended upon the peripheral tissue, and had broken through the wall of the chest in various places. In this cavern Israel found an irregular calcareous body about the size of a No. 6 shot, which he sent to me for examination. I found it to consist of a small fragment of dentine, surrounded by a chalky mass composed of phosphate and carbonate of lime. Microscopic preparations from this revealed, beside the dentine, numerous threads of ray fungus, and there can be no doubt that the fragment was the carrier of the infection.

"You will also find another case of primary actinomycosis of the lungs referred to in my book, p. 299. In this case, reported by Baumgarten, the infection was caused by inspiration of the specific fungal elements accumulated in the left tonsils.

"In this connection you might be interested with the classification on p. 342 of my book. You will also find there that of one hundred and thirteen cases of actinomycosis hominum, fifty-three were produced by invasion of the ray fungus through the oral and pharyngeal cavities. W. D. MILLER."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Your letter of the 17th to hand, and in answer to your request, contained therein, to restate my remarks which I made five months ago, on the authorship of the removable bridge-work described and figured in the June, 1890, number of the COSMOS, p. 439, I have to say that the invention is that of Mr. Gartrell, of Penzance, Eng. (see p. 230, March, 1890, COSMOS), and is in no way attributable to Dr. H. A. Parr, of New York. Dr. Parr learned this bridge-work from Mr. Gartrell's demonstrations at the annual meeting of the British Dental Association in Brighton, August, 1889, and in Paris, a week later, at the International Dental Congress.

I am yours truly, H. BALDWIN, M.R.C.S., L.D.S.

37 CAVENDISH SQUARE, LONDON, W.
November 28, 1890.

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* A number of "Hints and Queries" have been unavoidably laid over.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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THE
DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

STUDIES ON THE ANATOMY AND PATHOLOGY OF THE TUSKS OF THE ELEPHANT.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

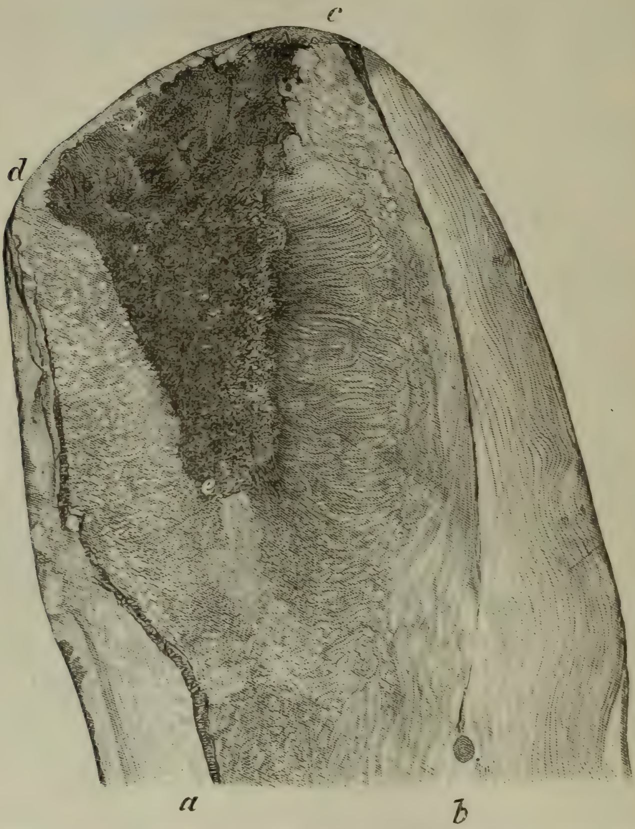
(Continued from page 679, vol. xxxii.)

THE EXPOSED PULP.

THE process of destruction of the hard tissue of the tooth so well known as decay or caries, does not occur in the tusk of the elephant. Exposure of the pulp is therefore brought about only by mechanical agents. Notwithstanding this fact, evidences of pulp-exposure are very frequently met with by anyone giving especial attention to the pathological conditions of the tusks of elephants. In by far the great majority of such cases the exposure is the result of fracture of the tusk, which occasionally gives way at some weak point under the immense strain to which it is subjected in the various uses to which it is put. Less frequently the pulp is exposed by sawing the tusks of tame elephants, either for the purpose of obtaining the ivory or of rendering the animal less dangerous. A case recently occurred in the zoölogical garden of Berlin, where the keeper in sawing the tusk of a bad-tempered elephant came upon the pulp. Finally, in rare cases, the pulp has been exposed by gunshot wounds. The extent of the exposure will of course be determined by the point at which the fracture takes place, and varies from a mere point, when the tusk is broken near the apex, to an opening two to four inches in diameter, where the fracture takes place at the alveolar border.

When in the human mouth a total exposure of the crown of the pulp is brought about either by caries or attempted extraction, one of three results may be expected: (1) the pulp may and usually does undergo a process of inflammation resulting eventually in partial or total necrosis, although it sometimes remains indefinitely in a state of chronic inflammation, without any apparent loss of substance; (2) it may, especially in the case of molars, become the seat of a new formation, giving rise to the so-called polyp of the pulp; (3) it may become calcified.

FIG. 47.



A longitudinal section through a short cut from the end of a tusk which was broken off at *d*, *c*. *d*, *a*, *b*, *c*, the pulp-chamber at the time of the accident, is now, with the exception of the cavity *d*, *e*, *c*, filled out with a conglomerate of dentinal and osseous tissues. The end of the tusk has been slightly rounded off by wear. Natural size.

The last event, so seldom observed in human teeth, is the usual result of fracture in the tusk of the elephant; whereas the result mentioned under 1 comparatively seldom occurs, and a polyp of the pulp, in the sense used in relation to the human teeth, would naturally be impossible in consequence of the rough usage to which the tusk is subjected.

In Fig. 47 I have represented a longitudinal section through the end of a tusk broken off at *d*, *c*, where the pulp at the time of the accident had a diameter, *c*, *d*, of a little more than five centimeters (about two inches). It will be seen that a comparatively small loss of substance took place, as shown by the hollow *d*, *e*, *c*. The whole plug, as we may call it, *d*, *a*, *b*, *c*, which has completely closed up the broken end of the tusk, consists toward the center of an exceedingly irregular osseous matter which gradually becomes more regular as we approach the margins of the normal ivory, *c*, *b*, and *d*, *a*.

No change in the structure of the ivory already formed at the time of the accident can be detected.

I have observed a number of cases in which the exposed pulp calcified with still less loss of substance than in the case here described; in other cases again the loss is greater, as in one tusk in my possession in which a piece of the pulp six inches long was thrown off before calcification began.

The wonderful reparative power exhibited by the pulp of the elephant's tusk is well illustrated by the stump of a tusk which I recently saw at one of the ivory depots in Berlin. The very large tusk had been broken off at the alveolar border, where the pulp had a diameter of four inches; the whole of the stump was subsequently completely filled up with a conglomerate of osteo-, vaso-, and tubulo-dentine in varying proportions.

The following case is of unusual interest because its exact history is known. In sawing off the tusk of one of the elephants in the zoölogical garden of this city, the operator came upon the point of the pulp (not, however, without the evident disapproval of the elephant). Having heard of this fact from the keeper, I patiently waited for six months, when another small piece was sawn off which I obtained for examination. It showed a slight deposit of irregular ivory just about the point of exposure, indicating an inflammation of the pulp at this point; beyond this everything was in a perfectly normal condition, and the pulp had gone on performing its function of depositing ivory with no apparent disturbance or interruption whatever.

Here again, as everywhere else, we observe a fact that may not be quite welcome to the advocates of eburnitis, viz: that the ivory itself, where it was sawed through, does not show a trace of any reaction. I have, however, already multiplied to such an extent the proofs of the reactionless nature of ivory under the severest irritations, that it is certainly not necessary to refer to this fact more in detail in the present connection.

The reaction of the pulp when exposed by gunshot wounds has been referred to in a previous communication (DENTAL COSMOS, July, 1890).

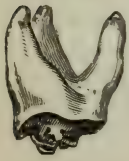
Occasionally the exposure of the pulp by fracture of the tusk near the base seems to be accompanied by much more serious results, as seen in the case of a captured elephant, who broke off both his tusks in a fit of rage and had to suffer the consequences in form of a large abscess on each side of the jaw. C. S. Tomes states that inflammation and destruction of the pulp often follow the sawing of the tusks of captured elephants, if this be done too near the socket in a young animal. ("Transactions of the Odontological Society of Great Britain," 1878, p. 77, note.) In accordance with my experience I should modify Tomes's statement by substituting sometimes for often. I am inclined to believe that a total destruction of the pulp, unless the injury has been of a most violent nature, is a very rare occurrence. The pulp of the elephant's tusk sits upon a broad, open base, so that total necrosis in the way in which it often occurs in the human tooth, by strangulation at the apex of the root, cannot take place.

I have frequently been asked whether I supposed that the elephant whose pulp was exposed suffered much pain. I am not able to answer this question from direct observation. In the case above referred to, when the pulp was sawed open, the elephant began to cry "most fearfully," and the only way in which the operation could be completed was to saw in from the opposite side and then break the tooth off with a heavy hammer. When the tusk was sawed a short time ago, the elephant apparently remembered the previous operation, and it was with considerable difficulty that he could be prevailed upon to submit to what he thought might be a repetition of the former experience.

Inflammatory processes in the contracted portions of the pulp toward the apex of the tusk, in all probability give rise to pain very like that accompanying pulpitis in human teeth ; toward the base of the pulp, where expansion of the tissue may take place, the pain is probably not so intense.

In the human tooth the calcification of a pulp which has been exposed by breaking off the crown in an attempted extraction is an event of such exceedingly rare occurrence that up to the present but one case of this nature has been described in dental literature. This case will be found in Tomes's "System of Dental Surgery," under calcification of the pulp :

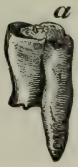
FIG. 48.



"A patient applied to have the roots of a first molar removed, the crown having been broken off many months previously, when, for the relief of pain consequent upon caries, the extraction of the tooth was attempted. The pain ceased after the fracture, and the roots of the tooth were allowed to remain. After the lapse of some months, the remains of the broken tooth caused annoyance and they were removed. The specimen (Fig. 48) shows that the tooth was broken through about the middle of the pulp-cavity, projecting from which we now find a mass of secondary dentine. It not only projects from the cavity, but hangs over and conceals the sharp edges produced by the fracture. It is obvious that in this case the vitality of the pulp was maintained, that it became enlarged subsequent to unsuccessful operation, and afterward calcified."

In Figs. 49–51 I have represented a case which was observed in the practice of Zahnarzt Dieck, who has kindly permitted me to make use of it in this connection.

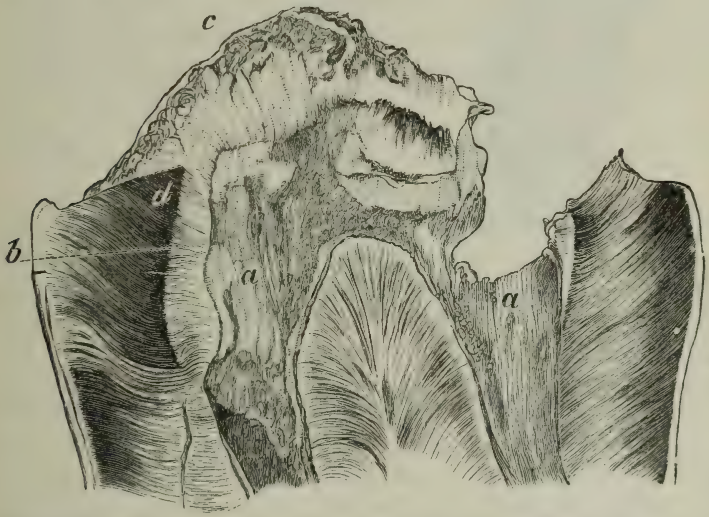
FIG. 49.



Neck and roots of a fractured bicuspid, showing the calcified pulp, *a*, overlapping the margins of the pulp-chamber. Natural size.

In an unsuccessful attempt to extract an upper first bicuspid for a young girl, the crown was broken off at the margin of the gums and the pulp thereby freely exposed. One and a half years later she applied to Zahnarzt Dieck to have the root removed, as it caused her some annoyance through the irritation of the gums. The end of the root was found to be completely closed by a calcified mass of the size

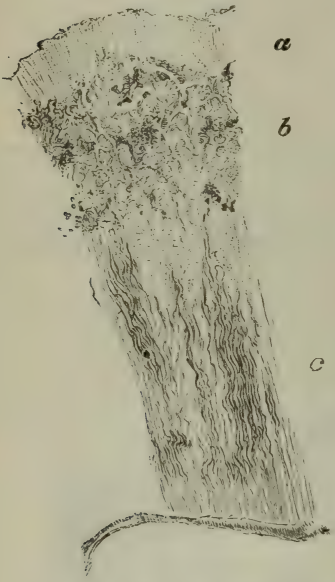
FIG. 50.



Longitudinal section through the cervical part of the specimen represented in Fig. 49. *a*, the semi-calcified remains of the pulp; *c*, the new formation of dentine overlapping the broken end of the root at *d*. At *b* we see the outline of the pulp at the time the fracture occurred. The right portion of the preparation was broken away in grinding. 16:1.

and shape represented in Fig. 49. Not only was the opening closed, but the new formation of hard substance considerably overlapped the broken edges of the root (Fig. 50), and at the same time the root-canals were filled up with a semi-calcified mass. A longitudinal section of the cervical portion of the root presented under the microscope the following structural peculiarities: The outer layer (Fig. 51, *a*) is seen to consist of an almost structureless, transparent substance, bearing no resemblance to dentine; this is followed by a zone of a very irregular substance (Fig. 51, *b*), containing numerous microscopic spaces, which in some cases bear a certain resemblance to bone lacunae; mostly, however, are entirely shapeless.

FIG. 51.



A portion of the new formation taken from about the point *c* in Fig. 50, and extending from the surface to the pulp. *a*, the outer zone of semi-transparent, nearly homogeneous substance; *b*, the zone of irregular osseous matter; *c*, the zone of dentine. 90:1.

This zone is followed by a third (Fig. 51, *c*), in which dentinal tubules appear, and the structure becomes in places very much the same as that of normal dentine; below this come the calcified but not dentinified remains of the pulp (Fig. 50, *a*). Evidently in this case the exposure was followed by considerable proliferation of the pulp. Whether this was protected by the gums or by the neighboring teeth, or whether the patient used the other side of the mouth exclusively in eating, I am unable to say; at all events the insults to which the soft tissue was exposed were not too great to prevent a process of calcification taking place in the periphery, giving rise to the structureless layer *a*. This having been formed, it afforded a certain protection to the pulp, which appears gradually to have undergone a process of reorganization, giving rise to the irregular substance *b*, followed by the comparatively regular dentine *c*. Or we may suppose that in the proliferation of the pulp the odontoblasts took part only in the beginning and that subsequently the growth was confined to the other non-specific elements of the pulp, consequently in the outer portions there would be no odontoblasts, and therefore no dentinal tubules. Others again who assert that the connective-tissue cells of the pulp may become transformed into odontoblasts and perform their functions would explain the presence of dentinal tubules in this case as they do in case of pulp-stones, on the supposition that even if the odontoblasts totally disappeared from the surface of the pulp they would be re-formed again after it became protected by a crust of calcific matter. Which, if any, of these views is the right one, the reader must decide for himself. I shall, however, revert to this question in the next article of this series.

The fact that the pulp of the elephant's tusk usually does, and that that of the human tooth when freely exposed *may* become calcified, in spite of the constant irritation to which it is subjected, gives rise to the question whether any use of this evident self-protecting power of the pulp may be made in the conservative treatment of this organ; whether, in case of total exposure, or of hypertrophy or polyp of the pulp, or even of partial exposure, a metallic cap (probably best of lead),* fixed in place by cement, simply to protect the pulp from injury, might not under certain conditions result in calcification, where the ordinary capping of cement would be followed by the death of the organ.

A case which lends support to this suggestion was reported by Sauer in the *Berliner Klinische Wochenschrift*, 1867, No. 24. A portion of the crown of an incisor was broken away by the kick of a horse, freely exposing the pulp. Two weeks later Sauer fitted a cap of gold over the tooth, and the opening of the pulp-chamber completely closed within three weeks.

(To be continued.)

FRACTURE AND DIASTASIS OF THE SUPERIOR MAXILLAE AND UPPER BONES OF THE FACE, TREATED BY THE AID OF THE INTERDENTAL SPLINT AND CRANIAL SUPPORT; WITH THREE CASES IN ILLUSTRATION.

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(Read before the Section on Odontology of the Tenth International Medical Congress, Berlin, Germany, August 9, 1890.)

MR. PRESIDENT AND GENTLEMEN: The subject which is now presented for your consideration is one which has received but little attention, either by the general surgeon or the oral specialist, while several of the leading works on surgery make no mention whatever of this class of injuries. This is due, no doubt, to the fact that such accidents have been of rare occurrence. But since the general introduction of passenger and freight elevators into hotels, office-buildings, and large manufacturing establishments, accidents of this nature are much more likely to occur and will doubtless become more common. My own experience at least leads me to this conclusion, for during the last ten years about twenty-five per cent. of all the cases of fracture of the bones of the face which have come into my hands for treatment have been the result of such accidents.

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*I suggest lead because it is well known that leaden balls shot into the pulp of the elephant's tusk cause much less disturbance and heal much more readily than balls of other material.

Fractures of the superior maxillary bones are, from the protected location of these bones, quite rarely met with, except in the alveolar process. Such injuries are usually the result of the extraction of the teeth, or blows or falls upon the chin which separate or split open the walls of the alveoli. This is accomplished in the one case by the lateral force applied in breaking up the attachments of the roots of the teeth, and in the other by driving the teeth upward and through their alveoli.

Such injuries, however, are never very serious, and rarely require special apparatus to maintain the fractured bones in their normal positions. I shall therefore lay aside all consideration of this class of accidents, and confine my remarks to the more serious injuries of this location, viz : *Fractures and diastasis of the superior maxillæ and upper bones of the face.*

Three cases have recently come under my care at St. Luke's Free Hospital ; the first led me to make a somewhat careful examination of the text-books and periodical literature bearing upon this subject, and so far I have been able to gather together but nineteen cases which can be fairly classed as similar to those which form the inspiration of this essay.

Injuries to the bones of the face which cause comminuted fractures and separation from the bones of the cranium are always the result of great violence : like the passage of the wheel of a carriage over the face, falling from a great height, the kick of a horse, a blow in the face by some heavy missile thrown with great force, or a gunshot wound ; crushing of the head between a moving elevator and the floor, the overturning of a carriage upon the occupant, or other heavy, crushing force. Such injuries are always serious and often prove fatal, either from shock, hemorrhage, direct injury to the brain, or later complications.

In such cases as survive the shock of injury and escape immediately serious complications of the brain, a favorable termination may be looked for, and in many cases, if properly treated, with very little deformity. This, however, will depend very much upon the character and location of the particular injury, and the success obtained in readjusting the fractured and dislocated bones and maintaining them in their proper positions. For the purpose of reference I have grouped together the various published cases which I have found in my search, but shall only mention, very briefly, the extent of the injury and the percentage of fatality.

In speaking of this class of injury, Erichsen* says, "In some cases all the bones of the face appear to have been smashed and separated from the skull by the infliction of great violence." He mentions four cases of this form of injury: one reported by South, one by Vidal, and two which came under his own notice.

The injury in South's case was caused by the man being "struck in the face by the handle of a rapidly revolving crank." All the bones of the face were "separated and loosened," and so comminuted as to feel "like beans in a bag."

Vidal's case, also a man, was injured by a "fall from a great height, and separated all the facial bones."

Both of Erichsen's cases were the result of falls from a considerable elevation and striking upon the face. The two former recovered, the two latter died in a few hours.

Packard† mentions three cases: one by Cotting, in which the face was crushed by a cart-wheel passing over it; another, brought to the Pennsylvania Hospital, in which the injury was received by the head being caught between the platform of a steam hoisting-machine and the floor; and the last one, a case reported by Heath in his "Injuries and Diseases of the Jaws," which was under the care of Dr. Fyffe. The first and last cases recovered, but in the other death ensued in a few hours.

Heath‡ describes two cases. The first came under his personal notice, and was "caused by the passage of a wagon-wheel over the face. The bones were completely crushed and separated one from another, and death was instantaneous." The second one is that reported by Dr. Fyffe, and is the same case referred to by Packard, and will be described later.

Tiffany§ mentions a single case which was reported by Professor Christopher Johnston. The patient, a gentleman, was struck in the face by the walking-beam of a steamboat. All the bones of the face were crushed, and "seemed literally to consist of a bag of bones moving freely with inspiration and expiration, so extensive was the comminution." This case made a good recovery, and an excellent result was obtained by supporting the superior maxillæ by means of a silver wire passed through the cheeks and under the teeth, and uniting the ends of the wire over the top of the head by a rubber band.

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* Erichsen's "Science and Art of Surgery," 8th ed., 1884, vol. i, p. 545.

† Ashhurst's "International Encyclopedia of Surgery," vol. iv, p. 67.

‡ Heath's "Injuries and Diseases of the Jaws," 3d ed., p. 59.

§ "American System of Dentistry," p. 568.

Richard Wiseman* published the report of the first case on record, and described the method of treatment. The patient was a little boy eight years of age, who was kicked by a horse and the whole upper jaw driven in, so that the finger could not be passed behind the palate. A flattened hook was constructed which could be inserted behind the palate, and by extension constantly maintained by the patient and assistants. The bones were held in place and a good recovery followed.

Dr. Fyffe,† of Westminster Hospital, London, has published the report of one case. This patient was thrown from a cab, the vehicle turning over upon him. The superior and inferior maxillæ were fractured, and the bones of the face detached from the skull so that the former "moved up and down in the act of swallowing." This patient also recovered.

Holmes‡ describes a single case, in which the bones of the face were crushed and dislocated by a carriage-wheel passing over the face, and in which, after recovery, there "was a disagreeable lengthening of the face as a result of the injury"; but more likely this was the result of the treatment. Among the methods of treatment suggested are gutta-percha molds, cork disks placed between the teeth, wiring of fragments, and carefully adjusted pressure by the Hanesby truss.

Hamilton§ refers to one case which came under his own care, in which the upper bones of the face were fractured and torn from their attachments to the cranium, and had to be supported to keep them in place. The patient died on the twelfth day after the injury.

Mason|| reports a case which was under the care of Mr. Bickersteth, of Liverpool. A gentleman standing upon the deck of a steamer was struck upon the side of the face by an iron hook attached to the hawser, which had parted under a heavy strain. On examination "immediately after the accident, the mouth seemed to be filled by a piece of bloody meat, but on further examination this proved to be the muscles attached to the upper jaw; the orbital plate of the superior maxilla of the injured side was found beneath the cheek, whilst the palate process with the alveolar ridge and teeth were, for the time, situated in the upper part of the pharynx, looking toward the bodies of the upper cervical vertebræ. The facial surface of the bone took the place of the roof of the mouth, jamming the jaws open.

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* "Treatise on Surgery," 1734, by Richard Wiseman.

† London *Lancet*, July, 1860.

‡ Holmes's "Principles and Practice of Surgery," p. 197.

§ Hamilton's "Fractures and Dislocations," p. 102.

|| Mason's "Surgery of the Face," p. 71.

The soft palate was not torn, but considerably injured. The superior maxilla of the injured side was turned completely upon its axis.

"The detached mass was replaced, the lower jaw firmly closed upon it for support, and the whole rapidly united with scarcely any deformity."

Mr. John Salter[*] reported a case in which the superior maxillæ and malar bones were separated from their attachments with the skull, and so crushed as to feel like a mass of "loose bones."

Dr. Harris,[†] of New York, also reported a case of a little child only two years of age, who fell a distance of fifty feet to the pavement, striking upon the face and sustaining fractures and separation upon the median lines of both superior maxillæ and palate bones. "Union had not taken place six weeks after the injury."

Mr. Houghton[‡] describes a case in which the "superior maxillæ were so fractured and displaced as to make it impossible for the patient to protrude the tongue until after the bones had been adjusted to their normal position."

Bryant[§] mentions one case in which "the superior maxillary bones were completely detached from the skull, and could be moved about in any direction, yet a good recovery ensued."

Agnew[||] mentions the cases of Wiseman, Fyffe, and Packard, but describes no new cases.

Garretson[¶] reports two cases. The history of the first was furnished him by Professor Agnew, in which a lad was crushed between the bumpers of two railroad cars, and sustained diastasis of all the bones of the face from the skull, comminuted fracture of the superior maxillæ, and four fractures of the lower jaw. The patient recovered, but with considerable deformity.

The second case, a painter, came under his own care. The injury was caused by falling from the roof of a house and striking upon the pavement below. He sustained severe comminuted fractures of the superior and inferior maxillæ, and fracture of both arms and legs. Several splinters of bone were removed from the anterior portion of the lower jaw; this allowed the parts to fall together, "the symphysis of junction being midway between its former position and the hyoid bone." The patient made a good recovery, but with considerable deformity.

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[*] *Medical Times and Gazette*, June 5, 1869, p. 600, from Mason's "Surgery of the Face," p. 70.

[†] *New York Medical Journal*, vol. xiii, 2d Series, p. 214.

[‡] *British Medical Journal*, January 2, 1858, p. 15, from Mason's "Surgery of the Face," p. 71.

[§] Bryant's "Practice of Surgery," p. 397.

[||] Agnew's "System of Surgery."

[¶] Garretson's "Oral Surgery," 4th ed., p. 805.

SUMMARY OF CASES.

Operator.	No. of Cases.	Cause of Injury.	Recovered.	Died.
Wiseman	1	Kicked by a horse	1	
South	1	Struck by a revolving crank	1	
Vidal	1	Fall from a great height	1	
Erichsen	2	Fall from a great height		2
Cotting	1	Crushed by cart-wheel	1	
Packard	1	Crushed by hoisting-machine		1
Heath	1	Crushed by wagon-wheel		1
Johnston	1	Blow from walking-beam of steamboat	1	
Fyffe	1	Crushed by overturned cab.	1	
Holmes	1	Crushed by carriage-wheel.	1	
Hamilton	1	Not stated		1
Bickersteth	1	Struck by iron hook	1	
Salter (John)	1	Not stated	1	
Harris	1	Falling from window	1	
Houghton	1	Not stated	1	
Bryant	1	Fall from great height	1	
Agnew	1	Crushed between car-bumpers	1	
Garretson	1	Falling from a house-top	1	
Total	19		14	5

Per cent. of mortality, 26.34.

With regard to gunshot fractures of the bones of the face, the Surgeon-General* of the United States reports that from the beginning of the civil war to October, 1864, there were reported 4167 cases of gunshot wounds of the face of all kinds. Of this number, 1579 were fractures of the various bones of the face; 891 recovered, 107 died, and in 581 cases the results had not been ascertained. The greatest cause of fatality in these cases was secondary hemorrhage.

In the "Medical and Surgical History of the War of the Rebellion"† the whole number of gunshot fractures of the various bones of the face is stated as being 4502; recoveries 3700, deaths 404, undetermined results 398, and the percentage of fatality 9.8. "The results of gunshot injuries of the face confirm the opinion that these wounds commonly do well, notwithstanding the amount of destruction apparent at the time of the injury."

The apparent lower rate of mortality in this class of injuries is doubtless due to the fact that all forms of fractures of bones of the face have been included in this table. If, however, the more serious cases (similar to those covered by the title of this essay) could be grouped together, I should expect to find the percentage of fatality considerably higher.

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* Surgeon-General's Reports, vol. i, p. 289.

† Part iii, vol. ii, p. 688.

With this brief summary of the history and results of the various cases which I have been able to find on record, I will present those which have lately come under my own observation, with the hope that they may prove interesting, and that the means used in their treatment will be helpful and suggestive to others who may be called upon to treat this class of injuries.

*Case 1.**—Conrad A., Swede, æt. twenty-eight years, occupation sawyer, employed at the Pullman Palace Car Works, Pullman, Ill., was brought into St. Luke's Free Hospital on March 15, 1887, in an unconscious condition, with an incised wound of the right cheek, starting from a point just below the inner canthus of the eye and extending obliquely backward and downward a distance of four inches, exposing the superior maxillary bone and completely penetrating the cheek, leaving a considerable external opening into the mouth.

This wound had been sewed up by the surgeon at the works. The right malar bone was crushed, both nasal bones were fractured and separated at the naso-frontal suture. The left zygomatic process was fractured near its union with the malar bone; both superior maxillæ were torn loose from the bones of the cranium, so that the whole mass was loose and freely movable in any direction, and suspended by the soft tissues. When the mouth was opened to its fullest extent, the teeth of the upper jaw rested upon those of the lower. Both superior maxillary bones were also fractured on a nearly perpendicular line; on the right side between the first and the second molars, on the left between the second bicuspid and first molar. Openings existed in both antra. The right could be entered with the probe through the wound in the cheek, and also through the alveolar process on the buccal aspect between the roots of the first and second molars, while the left could be penetrated through the buccal surface of the alveolar process on the line of the fracture between the second bicuspid and the first molar.

The palate process and palate bones were also badly crushed, forming a compound comminuted fracture, with loss of bone-tissue, leaving an opening in the hard palate on the right side near its posterior edge and the median line, through which the index-finger could be freely passed. The bones of the internal nose were badly comminuted, and several pieces which were loose were removed.

The left side of the face was completely anesthetic over the whole region supplied by the infra-orbital nerve, while upon the right side the upper lip and the wing of the nose only had lost sensation. The inferior maxilla was not injured, and none of the teeth were lost by the injury in either jaw.

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*St. Luke's Free Hospital Reports.

The accident occurred by the patient being struck in the face by a piece of oak timber twelve inches long and nine by eight inches in diameter, which was thrown by a circular saw eighteen inches in diameter, and revolving at the rate of about three thousand revolutions per minute. When the patient was admitted, the chances for recovery seemed very small. Cold applications were ordered over the face, and stimulants hypodermically, if the temperature should fall below normal and the pulse below 60. Nourishment to be given if possible, and one-fourth grain of morphia to allay pain.

March 16. Swelling of parts very great, both eyes closed, and nasal passages completely plugged. Pulse 84, temperature 101.8°. Would arouse when spoken to.

March 17. Patient has rallied. Pulse 74, temperature 100°. Seems to be conscious. Swelling less.

On the 18th his temperature was normal and did not rise again above that point, and he rapidly improved in general condition from this date.

The treatment of the jaws was begun on the 17th, and consisted of first wiring the posterior fragments of both superior maxillæ to the anterior or middle portion by means of silver wire passed around the teeth on either side of the fractures. The fractured palate bones and the palatine processes were then molded into place as nearly as possible with the fingers, and the nasal bones lifted into position by means of the handle of an instrument. The lower jaw was then closed upon the superior teeth, care being taken to get a correct occlusion, and held in position by means of an occipito-frontal and occipito-mental bandage.

The following night the patient tore off the bandages several times. The nasal passages being closed, he had great difficulty in breathing when the jaws were held tightly together. The bandages were therefore reapplied more loosely, but this allowed the injured bones to fall out of place, and defeated the object in view. The foregoing is the plan of treatment usually recommended by such authors as mention this class of injuries, but in my hands it has proved a signal failure, from the fact that the nose has been so injured and the parts so badly swollen as to close the nasal passages for several days, and therefore making it impossible to breathe with any degree of comfort except through the open mouth.

In any severe case there must be considerable difficulty in maintaining the position of the fractured and dislocated bones when this plan is adopted, and it is nearly impossible in those cases in which all the teeth were lost prior to the accident, for it is a well-known fact that as a rule edentulous jaws do not come in contact, and if they should, a normal occlusion would not be obtained, nor the injured parts prevented from slipping out of position. The plan of treatment adopted by Professor Johnston is also objectionable by reason of the wounds made in the cheeks. In my cases I was compelled to devise some other means, one which would maintain the position of the fractured bone and at the same time leave the lower jaw free, so that the mouth could be open for the purpose of breathing. This was accomplished by adapting the principle of the Kingsley interdental splint to the upper jaw and supporting it from the cranium. Impressions of the upper and lower teeth were taken in modeling compound, by first molding it on the upper teeth, and while it was yet soft forcing the lower jaw upward till a correct occlusion of the teeth was obtained. This impression was trimmed to the desired shape, and a one-eighth inch steel wire was imbedded in the sides upon a line with the ends of the teeth and then bent backward upon itself opposite the cuspids, and allowed to extend outside the cheek nearly to the lower border of the ear. From this was constructed a hard rubber splint with the wires attached. The splint can be made from silver swaged over metal dies ; but if a metal plate is desired, the most perfect adaptation can be secured by the electro-deposit plate and the wires be attached with solder. The splint is held in position by means of double elastic straps attached to the wire upon each side and buckled to a close-fitting leather or net cap, reinforced with leather

FIG. 1.

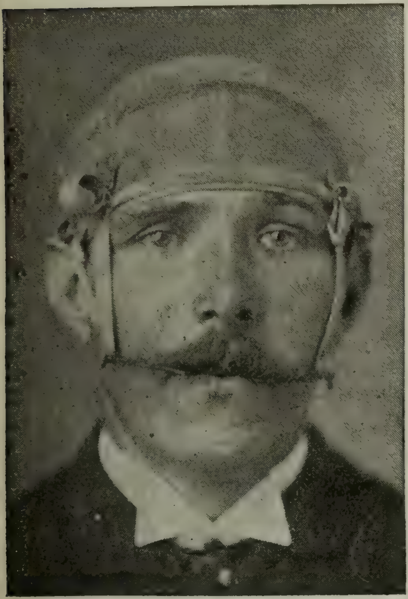
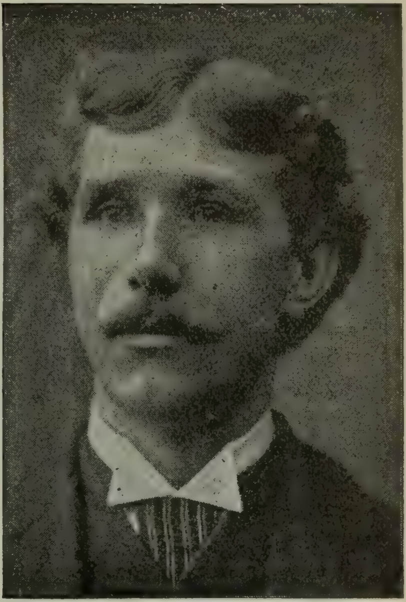


FIG. 2.



laced firmly upon the head. This appliance proved very successful, as it held the bones in their proper position, and permitted comfortable breathing and free movement of the lower jaw, which enabled him to talk and after a few days to masticate soft food. (See Fig. 1.)

Deep indentations were left in the under side of the splint, in which the lower teeth fitted accurately when the mouth was closed. The object of this was to furnish a sure guide to the normal position of the superior maxillæ. Without this the correctness of the adjustment of the bones could not have been verified. The importance of this cannot be overestimated. The only other treatment was good feeding and thorough irrigation of the wounds, antra, and the mouth, with a two per cent. solution of carbolic acid every two or three hours until the discharges ceased, and the removal of a few spiculæ of bone from the nose and the wall of the right antrum.

The patient was discharged on May 14, with small fistulous openings through the gums leading into both antra at the points of fracture, and a small opening in the hard palate which was gradually growing less. There was also a slight deflection to the left of the nasal septum. The opening into the right antrum soon closed, as did that in the hard palate.

June 22. Patient returned for the removal of the cicatrix in the right cheek, which was adherent to the maxillary bone.

June 25. Stitches removed and the patient discharged.

The opening into the left antrum remained patulous for some months, with slight discharge into the mouth, but finally closed. Sensation has been entirely restored in both sides of the face. (See Fig. 2.)

*Case 2.**—Henry S., German, æt. thirty-five, occupation laborer, employed at Armour packing-house. Was admitted October 7, 1887, one hour after the injury, which was caused by being struck across the bridge of the nose by a descending elevator while he was looking up the shaft. Was suffering from concussion of the brain when admitted. Examination disclosed the fact of a lacerated wound over the left eye and extending across the nose to the right eye. The finger could be introduced and readily passed down into each orbit, and against the fractured edges of the nasal and sphenoid bones. By taking hold of the upper teeth all the bones of the upper face were found to be movable, and when the mouth was open the upper teeth rested upon the lower and there was a peculiar and disagreeable elongation of the face. A later examination revealed the fact that the frontal sinus was crushed in, the nasal and lachrymal bones comminuted, and that all the bones of the face were torn loose from the skull on a line passing through the orbits ; and that the superior maxillæ were separated from the other bones of the face. The inferior maxilla was not injured. Several loose pieces of bone were removed from the region of the inner canthus of each eye by the house surgeon. The wound was stitched, drainage-tubes inserted, the lower jaw bandaged tightly against the upper teeth, and iced cloths ordered over the face and head. Pulse 60, temperature 97.4°. Stimulants administered freely. Profuse hemorrhage occurred during the night, and vomiting of blood every few hours until two o'clock on the following day. He became conscious during the night, but the other symptoms seemed to give but little hope of a final recovery.

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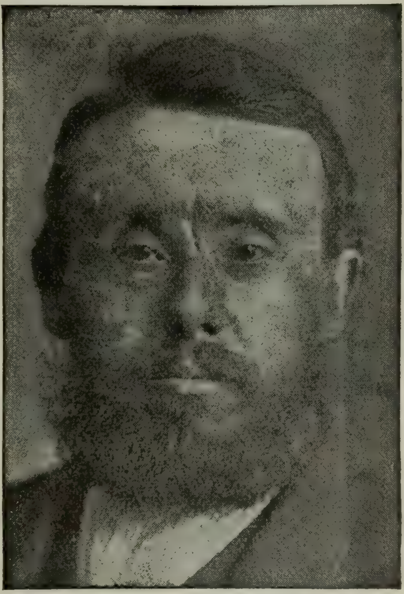
* St. Luke's Free Hospital Reports.

The temperature reached 102.2° on the 8th, at 4 P.M., and fell to normal on the 9th. No brain-symptoms developed, and the patient rapidly improved in general condition from this time. Swelling and suppuration were so extensive for several days as to render the adjustment of a splint impossible. The treatment consisted of stimulants and thorough irrigation of the wounds. The old method of bandaging was resorted to, but proved a failure, for the reason that the lower jaw could not be held sufficiently closed to support the fractured bones in their proper position without obstructing breathing by the mouth. This was necessary, as nasal breathing was at the time impossible.

FIG. 3.



October 24. Inserted an interdental splint, constructed after the plan of the one used in the preceding case, and supported it from the head by the same means. The case progressed favorably, and was discharged on December 3, the bones having all united.

December 24. Patient returned, complaining of double vision. The lens of the left eye looked cloudy, and traumatic cataract was feared.

April 1, 1888. Patient seems entirely well. The double vision complained of has passed away, and the lens has cleared up. (See Fig. 3.)

*Case 3.**—Joseph J., Pole, aged seventeen years, employed in the printing-office of the Chicago *Evening Journal*, was admitted to St. Luke's Hospital at 4 P.M., May 9, 1889, in an unconscious condition, and within an hour after the occurrence of the accident, which was caused by a blow across the left orbit from a descending passenger elevator while he was in the act of looking up the shaft.

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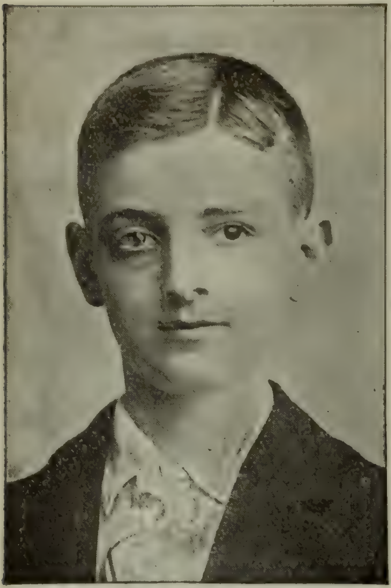
* St. Luke's Free Hospital Reports.

The external tissues about the left eye and right side of the chin were badly lacerated and bruised; the superior maxillæ were fractured upon a line with the orbits and at the articulation with the sphenoid bone, and so displaced that the posterior portions of the superior maxillæ hung down and prevented the closing of the mouth, and causing a separation of the anterior teeth by the space of one-half an inch. Upward pressure applied to the region of the superior molars carried the bones into position, but upon a removal of the force they immediately fell back again. The bones of the face were not comminuted as in the before-mentioned cases, but they were freely movable upon slight pressure.

FIG. 4.



Swelling was very great from effusion, and there was also a considerable protrusion of the left eye, with effusion of blood into the anterior chamber. The face and eye were immediately dressed with cold applications, and ice applied to the head. Hemorrhage was slight. Later in the evening consciousness returned, and at no time afterward did any brain-complications arise. Pulse 70, temperature normal. One-fourth grain of sulphate of morphia was administered to allay the pain.

An attempt was made to reduce the diastasis of the bones by bandaging the jaws together, but this could not be borne on account of the injury to the nasal passages, causing inability to breathe, except through the open mouth, while the swelling was so great as to make it impossible at that time to take impressions of the jaws.

May 10. The temperature rose to 100° F. On the 12th it fell to normal, and did not again go above that point.

The general treatment consisted of nourishing liquid diet, and thorough irrigation of the external wound and the mouth every hour with Tiersch antiseptic solution. The treatment of the eye was placed in the hands of the attending ophthalmologist.

May 14. The patient was up and doing well. Impressions were taken of both jaws, and an interdental splint constructed upon the same principles as the others.

May 16. Splint inserted and supported from the head, which brought the bones into their normal position. The appliance was worn with comfort, and at the end of seven weeks the patient was discharged, cured, with no deformity save the loss of the sight in the left eye. (See Fig. 4.)

REMARKS.

In Case 1 the occlusion of the teeth is nearly if not quite normal; and it will be seen by the photographs taken since the patients were discharged that in Case 1 the only deformity visible is a slight flattening of the right superior maxilla and the faint line of the cicatrix resulting from the incised wound in the cheek.

In Case 2 the occlusion of the teeth is equally good, but the deformity of the face is greater. This is the result of the loss of portions of the nasal bones and the external wall of the frontal sinus, and the adhesion and contraction of the cicatricial tissue over these places.

In Case 3 the occlusion of the teeth is perfect. There is no deformity of the face, and but for the loss of sight in the left eye and the scar upon the right side of the chin, no evidence would be left to tell of so serious an injury.

The interdental splint used in Case 3 was made by electro-deposition by Mr. E. E. Clark, of Newark, N. J., and is made upon the same principle as the deposit dental plates. The caps for the upper and lower teeth were each made separate, and then soldered together and the arms attached in the same manner.

The advantages of the metal plates over the vulcanite are that they are not so clumsy, do not take up so much room in the mouth, and are less liable to break. The advantage of the splint made by the deposit method over the swaged splint is, better adaptation. In the item of time and expense of making, there is but little difference between them.

The cranial support was made by Charles Truax & Co., of Chicago.

THE DESCENT OF EXPRESSION.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

"Thy face itself
Half mated with the royal stamp of man,
And half o'ercome with beast."

"Before Darwin declared us brothers in the name of Morphology, Nature had long united man and animals in a great biological and psychical fraternity."—MANTEGAZZA.

It is not a very flattering reflection, perhaps, that the major part of our boasted human nature is animal in its origin, development, and leading characteristics. We talk loftily of our elevation and superiority, and boast of the wonderful things our species has done and of our wonderful intellectual accomplishments; and they are wonderful, but by a measure we do not like to apply,—*i.e.*, by comparison with the greater line of animal ancestry which lies so close at our backs rather than with the briefer human line since our emergence from the animal stage. It is because we are so nearly animal yet that our advancement is, in many respects, so wonderful. We admit that our physical organization is entirely animal, and that our moral nature is largely animal yet in its instincts; for it has not thrown off the thralldom it yet endures, of the long æons of savagery and animalism from which we have but lately emerged. Indeed, the brief historic period has done but little to release us from the savage influences of our prehistoric ancestry. By special effort, perhaps, under the powerful influence of religious or other emotions, some few minds have been emancipated from this slavery completely, and others again but in part. Some of these become the pilots of their race in their struggle toward a higher and better life. These are the saviours of mankind which are lifting the race upward into a higher moral atmosphere. But the task is Herculean, for the legacy of primitive morals is continually dragging it backward into the mire. But intellectually we are, of course, far in advance of our animal and savage ancestors and are vastly removed from them, so that mentally, at least, civilized man bears but little resemblance to his lowly ancestry, and is quite another creature.

These high mental qualities are, however, resident in a body that is distinctly animal, although in its highest development the mind has had great influence in refining and beautifying the place of its residence. Especially has it refined and beautified the face, as the special seat of the outward expression of the mind and the emotions. Having studied the origin of the physical basis of the face, and the path by which its form and features have been carried forward and developed to their present perfection and beauty in the highest races of man; having traced this area of the body from its lowest beginnings and observed how the parts have, by the process of gradual evolution of mind and body together, become the seat of special expression, we wish next to notice some of the varieties presented by the features of the human face and their various expressions, and trace some of them back to their animal origin. This will, we trust, aid in the explanation, in a degree, of the extensive variation found in the face and features of men and of the endless differences that exist between faces, their forms and expressions, as between races of men and between individuals of the same race. We wish at the outset, however, to declare that this investigation is without any wish or even latent desire to detract from the dignity of our common humanity, but that the study is pursued only in an humble philosophic and scientific spirit. It is mainly with an earnest desire to contribute something toward the finding of a scientific basis for the study of physiognomy and expressions, of which it at present stands so much in need, that such an effort is made.

We therefore submit our first postulate that all human faces are but composites, more or less complete, of inherited characteristics that have been accumulating during the slow lapse of the ages. All the animal and human elements of the individual are but the legacies of his ancestry. Faces vary so infinitely; but when we consider that pure races are now unknown, and that intermixture has been the rule since long before the dawn of history, we cannot wonder at the facial variation that exists everywhere. All nations are more or less mixed, and so faces are more or less mixed, and all composed of many racial elements. Variations and incongruity of features are mainly due to unequal development, induced by the conflict of different racial tendencies, and the omnipresent power of atavism causing the reappearance of long-absent peculiarities of feature. This conflict brings about retardation in some features and acceleration in others, just as in various organs and parts of the body which develop under the influence of the forces directing the evolution of the species. Some features remain more or less embryonic or infantile, and others bear a decided resemblance to primary animal types, especially with the quadrumanous and anthropoid forms. Others again are accelerated and much developed in man, and other features are much reduced, as compared with the lower primates. The quadrumana furnish many suggestions as to the origin of the human features, suggestions which, if followed up carefully, will furnish clues to many intricate problems of human physiognomy. We will therefore try to trace some of the human facial features and expressions back to earlier sources than even the pure races of mankind,—back to their shadowy beginnings, their animal origin. To do this we will need to make comparisons with the contemporaneous quadrumana and embryonic facial forms, which show the features in their immaturity—in their beginnings. We have studied the embryology of the face; we will now study the embryology of expression and its descent.

Professor E. D. Cope has brought this out to some extent in his "Origin of the Fittest," in the chapter on "The Developmental Significance of Human Physiognomy," and to this brilliant work we are much indebted for suggestions in this special field, as well as in other studies in evolution. He says, in regard to this subject, "Many persons possess at least one quadrumanous or embryonic character. . . . The immediate paleontological history of man is unknown, but may be easily inferred from the characteristics displayed by his nearest relatives of the order quadrumana. . . . The possession of quadrumanous characteristics by man approximates his form to that class, so far as the evidence goes. He may retain features which have been obliterated in other forms in the process of evolution. . . . In considering the physiognomy of man from an embryological stand-point, it may be compared with the peculiarities of the infant at birth. The face of the infant is relatively larger than the adult. Persons whose features possess any infantile characteristics are more embryonic in those respects than are others, and those who lack them have left them behind on the way to maturity. . . . We have here two sets of characters in which men may differ from each other. In one set the characters are those of monkeys, in the other they are those of infants, and some peculiarities are characteristic of both sets. Characters of the face of monkey-like significance are usually the opposite of those included in the embryonic, but in both the facial region of the skull is larger as compared with the cerebral. As the infant is less developed than the adult, it is evident that in attaining maturity man resembles more and more the apes in some important parts of his facial expression. . . . The differences between the embryonic and young monkeys and the adults are quite the same as those which distinguish the young from the adult man. The change is, however, greater in the case of the monkey than in the case of man. . . . As these characters result from a fuller course of growth from the infant, it is evident that in those respects the apes are more fully developed than is man. Man stops short in the development of the face and is so far embryonic. . . . The Indo-European is the highest in those things which add to beauty, according to his own ideal. . . . Increased size of the cerebrum and retardation of the face is a main characteristic. . . . We can thus explain the meaning of most of the faces we meet. . . . Quadrumanous indications are found in the lower classes of the most developed races. The status of a race is mainly determined by the percentage of its individuals who do, and do not, present the features in question. Some embryonic characters may also appear in individuals of any race as a consequence of special circumstances. A comparison between the two sexes of the Indo-Europeans expresses their physical and mental relations in a definite way. In the most civilized races the sex characters are most pronounced. As regards the face the distinguishing characteristics of the female are absence of beard, smoother skin, lower superciliary ridges, larger eyes, etc.''

In pursuance of this study photographs of contemporaneous, ordinary, faces were taken and classified, with a view of working out the resemblances and differences of features, and their evident descent. In pursuing the comparative study of the face and features, it was necessary at the start to separate the features, to cut up the faces in photographs,—as all the features which go to make up the curious composite of the ordinary face are rarely in harmony and often widely incongruous. Few faces have features that harmonize, and most faces have one or more features that are immature and incomplete and that are really either quadrumanous or embryonic. These degraded features do not indicate anything in the way of character-signs, however, but only that such features are immature and are not typically full-grown. A face in which all the features are matured and well developed and harmonious is beautiful because of the proportions and completeness. The ordinary face is usually degraded and unattractive because one or more of its features are incomplete and inharmonious. It was for the purpose of studying these degraded features that the following classification was worked out, photographic faces being dissected and the different features being collected and arranged according to types. From this classification and comparative study we drew the following observations :

The *forehead.*—Beginning with the superior portion of the face, we take first the forehead. Professor Cope says (*op. cit.*), ''The facial region of the skull is larger in the quadrumana, compared with the cerebral,'' the latter receding so that ''the forehead is not full and prominent and is generally retreating.'' We find this retreating and immature forehead in most idiots and weak-minded persons, and often in the lower races of mankind. The low forehead is, regardless of its bearing on mental power, a quadrumanous characteristic, and the opposite, the high full forehead, is the advanced, the human form. Yet a sloping forehead is not necessarily a sign of mental weakness, but only of the reappearance of a quadrumanous feature, and when it is accompanied by the covering of a brown, transversely wrinkled skin and low-growing hair, the resemblance is altogether too suggestive to be pleasant. Shrunken and anemic faces sometimes have this appearance, and occasionally an unhealthy infant.

From an embryological point of view, we notice in the fœtus and infant "that the cerebral part of the skull greatly predominates over the facial" (Cope). In the human infant, as in the young ape, the forehead is more full and rounded than in the mature form. In the embryo the forehead is disproportionately bulging and overhangs the face, so that a mature forehead that is too full is, in a sense, an embryonic form,—*i.e.*, the proper growth of the face to the type of normal proportions has not been accomplished and the forehead retains its embryonic predominance. Perhaps, however, it is the survival of a quadrumanous form, as the little squirrel monkey of South America has a disproportionately full forehead,—fuller than man himself. The embryonic fullness in all the primates may therefore be but the survival of a long-lost lower form, and be itself a reappearance.

Regarding the *eyebrows*, Professor Cope says (*op. cit.*), "The superciliary ridges are more fully developed in the monkeys, so that in man they are embryonic. Man stops short of completeness in the development of the lower face, and is so far embryonic. . . . The orbits of the eyes are smaller except in a few species, and the superciliary ridges grow more from infancy to maturity than in man." In man the brow is much reduced and is thus embryonic. In the great anthropoids the superciliary ridges are greatly extended, and in a few of the lower races of man are quite prominent, but in the higher races of man are reduced. They are thus rudimentary in man, but in occasional cases there is considerable development of the brow, so that it shelves outward like the anthropoids,—which is a reappearance. The temporal ridges, as well as the sagittal ridge, are much developed in some of the anthropoids, as the gorilla, for the more extensive attachment of the temporal muscles for giving greater power to the jaw. These ridges give a depressed appearance to the forehead, and a savage look. There is no reappearance of these ridges in man, unless it should be in an occasional example of the Mongoloid, Malay, or American Indian skulls, but it is very rare, and is perhaps only an anomaly.

"In infancy (Professor Cope, *op. cit.*) the superciliary ridges are not developed, and remain reduced through life," and their condition in the adult of mankind is therefore embryonic; the low eyebrow is merely an undeveloped feature.

The *eyes* are larger proportionately in the infant than in the adult, and are more prominent, the surrounding parts being undeveloped. With growth the eyeball recedes, owing to the bony socket developing about it. As compared with the quadrumana, the eyes differ but little as to external appearance and form. There may be a difference as to prominence or depression, but this is scarcely perceptible as between man and the monkeys and apes. Individuals vary greatly in all tribes and species. There is a great difference, however, as to the intellectual fire that lights the eye,—the indefinite something that reflects the will behind it. In this, as in his whole intellectual being, man is removed from the lower forms of life by a space whose vastness cannot be estimated.

The *nose*, Professor Cope says (*op. cit.*), "is without bridge in the quadrumana, and with short and flat cartilages. . . . The character of the prominent nose in the Indo-European man, with its elevated bridge, is a sort of acceleration, since it is a super-addition to the quadrumanous type from both stand-points of quadrumana and embryology, and is chiefly due, no doubt, to the greater development of the front of the cerebral part of the skull or ethmoid bone, which, developing later, carries the nasal bones forward with it. . . . In the Negro the nose is flat without bridge, which is a quadrumanous character and is a retardation of growth. . . . In the Bushman the flat nasal bones are co-ossified with the adjacent bones, as in the apes. . . . In the Mongols the nose is flat, with a bridge. . . . Many people, especially those of the Slavonic races, have more or less embryonic noses." Many races have the flat nose with low bridge, or the bridge may be totally absent. Many individuals of the higher races have flat noses, but the bridge is, if normal, always present.

In the infant "the nose is without bridge and the cartilages are flat and short,—quite quadrumanous, in fact." But the nose grows and develops more than any other feature of the face in the progress toward maturity. A well developed—a "strong"—nose is a strong feature and strengthens a face, giving character and force, but a small nose is a weak feature and makes a face appear weak. Many adult noses are small and undeveloped, are really "baby noses," and detract much from the beauty, harmony, and impressiveness of a face. A noble face with a small, insignificant nose cannot be imagined. It is the imperial feature, and dictates the character of the face. A small nose is embryonic, and has stopped short in the course of development at an immature stage. It does not really mean weakness in character, however, but only that the face has inherited a past form and did not reach the full attainment of its type, and the result is inharmony and mediocrity. The omnipresent mediocrity of the sea of faces around us is due largely to the prevalence of immature noses.

Then again, many noses of to-day are distinctly quadrumanous in some of the characteristics which they retain. The anthropoid nose is flat of bridge and crushed upward against the face, flattened and "stub-nosed," in fact. This form is seen in many "stub" noses,—"*retroussé*" if you please,—where the nose is distinctly upturned and retracted, as often occurs in Celtic, Negroid, and Slav races, and sometimes in others. In the Negro the wings are spread and enlarged also, as in the monkeys. Again, the American monkeys have noses with wide bases, with the nostrils set well upon the side, hence their name, *Platyrrhine*, wide-nosed. The Old-World monkeys have the nostril openings set close together beneath, and are called *Catyrrhine*, or narrow-nosed. Now, it is not unusual, especially among Negro and other low races, to see an approach to this wide-nosed form,—a wide pillar between the nostrils and the latter openings set more or less on the side of the nose. A slight approach to this is seen in very many individuals of the European races, and occasionally an instance that is quite pronounced. This is an inheritance,—an interesting survival of a very low form, a form which even the Old-World monkeys have passed over.

These survivals, or rather reversions, are interesting as showing that this important feature when not typically developed in man is only immature. It is an interesting organ also in that its normal development in man is superior to that of other animals and is due to accelerated growth. A fine, strong human nose is an acquirement of our species since its emergence from animalism.

By excessive and abnormal development the nose often simulates the proboscis of other animals, but the resemblance is merely accidental. Yet the physiognomists have made much of these resemblances as indicating the character of the individual,—that it resembled the animal thus simulated. This is of course absurd, but the idea was quite popular in certain circles in former days. It was part of the old physiognomy.

(To be continued.)

PALMER'S DENTAL NOTATION.

BY CORYDON PALMER, D.D.S., WARREN, OHIO.

So long ago as the year 1870, at the meeting of the American Dental Association in Nashville, I brought to the notice of the profession my system of dental notation, of which mere mention was made in the DENTAL COSMOS for October, 1870, page 523, as follows:

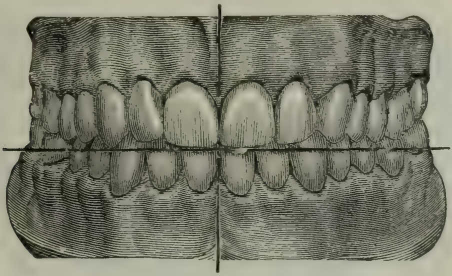
"He divided the mouth into four divisions.

"First, he exhibited a drawing of a head divided into four by a perpendicular and transverse line. This gave an upper and lower right and left division. In making a record it is well to know how to note this,—L. Sup., L. Inf., R. Sup., R. Inf. divisions.

"Second drawing gave the teeth, thirty-two in number. Commencing at central incisor, he numbers backward to eight. In this way he has the teeth of the four divisions described by numbers;

thus, the lateral incisor is No. 2, cuspid 3, and so on to wisdom-tooth, No. 8. The teeth thus become better known by their numbers than by their names. By the shape of the mark made he knows the kind of filling, and the position on the tooth by its relative position on the number designating the tooth."

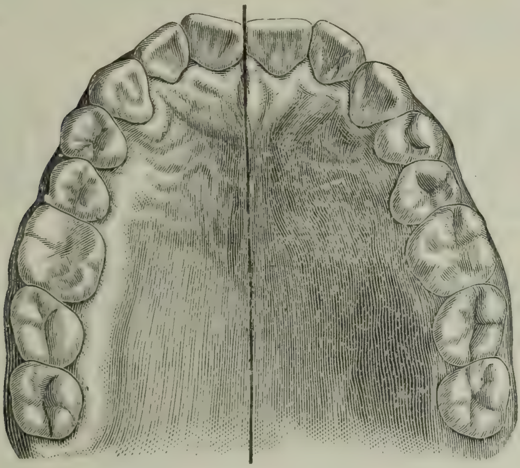
FIG. 1.



At that date illustrations were not as freely made use of in dental publications as at present, and so the models and charts which I then exhibited in explanation of my system were not reproduced in the report or in the Transactions. The following is a description of the system as then presented:

In Fig. 1 is represented the fundamental division of the oral apparatus into four parts by a horizontal and a perpendicular line, with the effect of graphically presenting to the mind's eye the external aspects of the several principal localities, which by means of those lines may be easily indicated in practice as Superior Right Side, Superior Left Side, Inferior Right Side, and Inferior Left Side respectively.

FIG. 2.



The corresponding interior division is represented by Figs. 2 and

3, which also show the crowns of the thirty-two teeth belonging to the normal human subject.

Fig. 4 presents in detail the numerical individualization of the several teeth by successive figures from 1 to 8 in each of the four indicated divisions. For precision of pictorial representation the numbers appear upon the crowns of the individual teeth depicted, and thus the learner is enabled to readily associate each number with the so symbolized tooth.

FIG. 3.

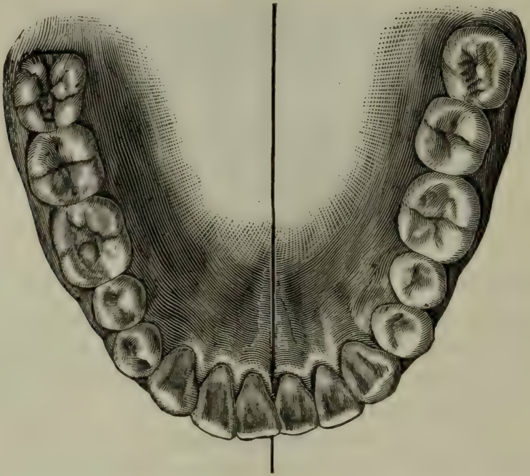
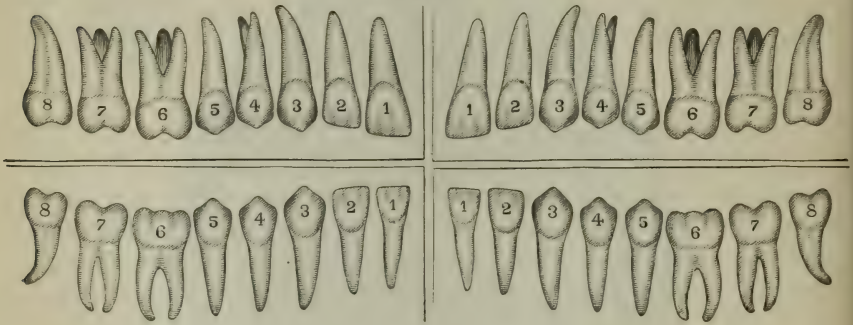


FIG. 4.



For example, the superior right cuspid would be indicated by $\underline{3}|$; the superior left second bicuspid by $|\underline{5}$; the inferior left second molar by $|\overline{7}$; the inferior right third molar, first bicuspid, lateral, and central by $\overline{8\ 4\ 2\ 1}|$.

For recording dental operations I devised a series of symbols as follows :

A single filling ‾, a double filling ⊔, a triple filling ш, a quadruple filling ⊔⊔, a nerve operation ▲, a quarter contour filling ◣, a half-crown filling ◘, a whole crown filling ◙. These were occasionally supplemented by abbreviations, as Co. for contour, Go. for gold, No. for nerve operation, Com. No. for compound nerve operation, Am. amalgam, etc. For example, a single distal filling in a superior right central would be made a matter of record by ‾ 1⏌, a double gold filling in a superior right first bicuspid by ⊔ 4⏌, a triple gold filling in a superior left first molar by ⎿6 ш, a quadruple gold filling in an inferior right second bicuspid by ⊔⊔ 5⏋, a nerve operation with a quarter contoured mesial gold filling in a superior right lateral by ▲ 2 ◢⏌, a half-crown gold filling in a superior left third molar by ⎿◘ 8, a whole crown amalgam filling in a superior right second molar by 7 ◙ Am⏌.

After more than twenty years' practical experience with this system, I can safely affirm its easy and expeditious adaptation to the making of a condensed and reliable record of dental operations.

The publication in the November DENTAL COSMOS and in the Transactions of the last meeting of the American Dental Association of Dr. How's paper on the "Hillischer System of Dental Notation," which is substantially the same as mine, leads me to call attention to the fact that it is original with myself, and that I brought it to the notice of the profession in the most public manner possible, as the records cited sufficiently attest.

Since that date dentists have frequently told me that they were using the system with satisfaction. I also recall the circumstance that in 1873 a young German dentist was visiting New York and called upon me. Among other things of interest to him, I showed him this system, and he took careful notes as I explained to him its details. His name I do not remember, and the interview was somewhat restricted by my ignorance of German and his unfamiliarity with English, although he spoke it well enough to render intelligible our professional consultations and explanations. He made careful copies of my charts, designating numerals and symbols, and saw such illustrations of the use of the system in daily practice that nothing was lacking for a clear understanding of the notation, even by one not familiar with our language. It may well be imagined, therefore, that I should naturally be disposed to enter an earnest protest against the importation under a German name of my own system of dental notation, which I had introduced and explained to the members of the American Dental Association at Saratoga in 1869, and more specifically described and illustrated at the Nashville meeting in 1870. I have only to add that the published record makes clear my claim to be the first to suggest a distinctively dental notation which nearly twenty years later was without credit to its author brought before the International Congress in Paris by a commission appointed to consider the subject. Their report commences as follows:

"This commission, first of all, decided that it was better to adopt a system of figures rather than one of letters to designate the various teeth. It was found that all the various systems of numbering teeth by figures might be classified into three systems:

"(*a*) The system of eight.

"(*b*) The system of sixteen.

"(*c*) The system of thirty-two.

"It was resolved that any system of numbering by thirty-two was inconvenient, confusing, and difficult to memorize. It was therefore unanimously rejected.

"The system of eight was warmly advocated. It consists of four groups of eight numerals, starting from the median line, the respective teeth of the upper or lower jaw being indicated by the position of the numerals above or below the horizontal line, and their situation relative to the median line being shown by a vertical line on the median line side of the figures.

"The alternative (Hillischer's) system, which substitutes a point or period for the vertical line, was also considered."

I respectfully submit that in justice to myself and for the credit of the profession in America the system of four groups of eight numerals should be termed The Palmer Dental Notation.

TEETH-REGULATING APPLIANCES AND RELATED DEVICES OF THIRTY ODD YEARS AGO.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

(Concluded from page 120.)

IN the *News Letter* for April, 1856, on page 184, Dr. J. D. White supplies illustrations here referred to as Figs. 14, 15, 16, and 17, which he describes as follows:

"Fig. 1 (Fig. 14) is the case viewed from the left side; the first superior bicuspid, canine, lateral incisor, and both front incisors falling inside of the lower teeth, which gives a lateral and forward projection to the chin and a peculiar warp to the face.

"Fig. 2 (Fig. 15) is the apparatus for the upper jaw; it consists of a plate swedged up to fit the roof of the mouth, and extending forward against the back part of the front teeth, in the same manner as if it were intended to insert teeth upon. It has attached to it, on the left side, an inclined plane, opposite the superior canine and lateral incisor, extending outward and downward, to grasp the inferior canine and bicuspid. This answers the double purpose of helping to throw the upper teeth out and the lower ones in, and the lower jaw to the right. It also keeps the jaws apart sufficiently to allow of the teeth, when they are moved, of passing each other. The bands are so constructed as to grasp over the crowns of the molar teeth in such a way as not to require filing. To the buccal sides of these bands are soldered a bar extending from side to side, and as far away from the front teeth as it is desired for them to be brought forward. To this bar, and around the necks of the teeth, ligatures are well fastened, either of India-rubber or flaxen thread. This apparatus must be changed every other day, and the teeth well brushed to remove all foreign substances. There are also attached to this plate caps for the back teeth, to prevent them from falling toward the opposite jaw while the apparatus is worn. This fixture was worn about one week before anything was done to the lower jaw, when a simple bar

FIG. 14.

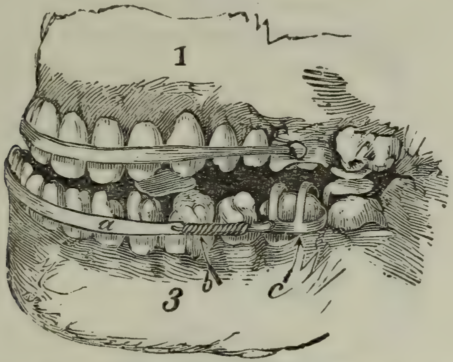
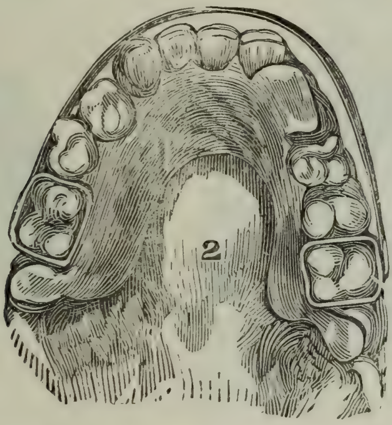
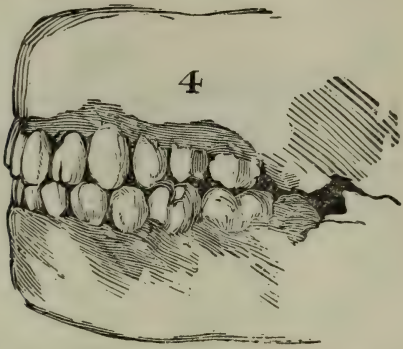


FIG. 15.



and caps were placed upon it, as seen in Fig. 3 (Fig. 14); *a* is the bar in front of the teeth; *b*, a spiral spring at one extremity, to give elasticity to the bar when placed over the front teeth; *c*, the bands over the second molar teeth, with caps extending over the wisdom-teeth in the same manner as the upper caps, to prevent them from rising from their sockets. This spiral spring has within it a piece of wire to prevent it from bending laterally, but it does not prevent the extensibility of the spring." (See Fig. 6.)

FIG. 16.



"Fig. 4 (Fig. 16) represents the operation completed, which occupied about five weeks; at this time the apparatus was removed, and a plate, Fig. 5 (Fig. 17) swedged up to fit the roof of the mouth, and touch the necks of all the front teeth, so as to prevent them from falling back to their former places. This may be worn for a long time, together with lower spring, to insure success."

FIG. 17.

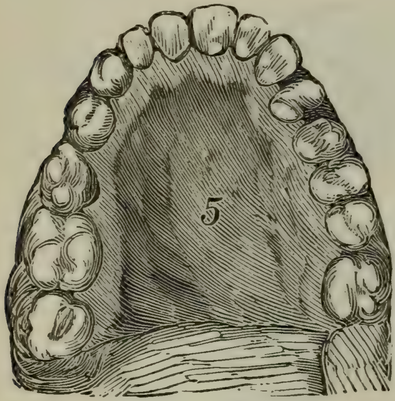
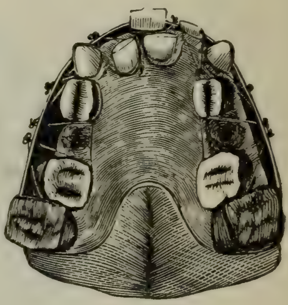
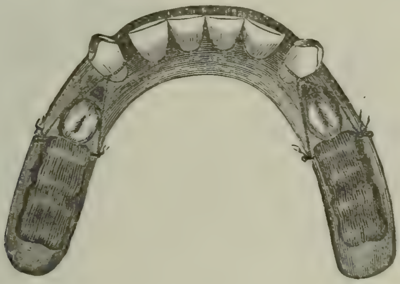


FIG. 18.



Earlier dates may possibly be found for some of the specified devices, but they suffice here and now to establish beyond question the facts that they were well known at the times mentioned. Harris, in his "Principles and Practice," sixth edition, 1855, on page 156 says a tooth may be rotated ". . . by accurately fitting a *gold ring or band* with knobs on the anterior and posterior edges; to each of these a ligature should be attached. The ligatures thus fastened to the *ring* should be carried back one on either side in front and behind the arch, and secured to the bicuspids in the manner as represented in Fig. 52, so as to act constantly upon the irregular tooth." This is another instance going to prove that knobbed or tubed rings completely surrounding, fitting, and conforming to the crowns of natural teeth in the mouth were common. On the next page, 157, Fig. 54 (Fig. 18) shows completely capped single teeth, to which caps a bar or bow-spring and also a plate are fixed. On page 166, referring to Fig. 68 (Fig. 19), he says ". . . a gold plate of the ordinary thickness should be swaged to fit the first and second molar on each side of the jaw, so as completely to encase these teeth. If these *caps* on applying them to the teeth in the mouth should not be found thick enough to prevent the front teeth from coming together, a piece of gold plate may be soldered on that part of each which covers the grinding-surfaces of the teeth, and having proceeded thus far a small gold knob should be soldered on each side of each cap, to which a ligature of silk or gum elastic should be attached."

FIG. 19.



He next describes and shows in Fig. 69 an arched regulating bar soldered at each end to the caps which entirely and rigidly support the bar in proximity to the lingual surfaces of the lower oral teeth, so that the soldering of artificial substitutes to such a bar would have been an obvious procedure to any dentist who would note the firmness and security of such a fixture when in position for regulating purposes. If he had been accustomed to the use of dental plastics, the cementing of those close-fitting gold cap crowns onto sound or carious teeth would then have naturally occurred to him, as it subsequently did to Drs. Wood, Morrison, Francis, and others.

Many other well-known old devices described without illustration might with advantage to the profession be given pictorial embodiment as in the preceding new cuts, but these old cuts in their unquestionably clear anticipation of later devices relating to dental regulation, crown- and bridge-work, will certainly prove serviceable, and are respectfully submitted to whom it may concern.

The devices which follow are some old and some new, but all embody the ancient principle of a spring-push or pull on the tooth or teeth to be moved. A simple form of finger-spring is that shown in Fig. 20. It is made by first cutting a pattern from thin rolled block-tin and fitting it to a plaster cast of the teeth, although in some instances I have fitted it over the teeth in the mouth. From a piece of spring gold plate the regulator is then cut, closely following the pattern. In some instances it is desirable to get a close conforming fit by striking it on a metal die made from the cast. It is obvious from Fig. 21 that successive bendings of the spring finger will soon bring into line and place the errant cuspid, and as during and after the moving of the tooth the regulator may be readily sprung off and on by the patient for cleansing purposes, it is also the fact that it serves as a retaining device which can be worn for any prescribed length of time.

FIG. 20.

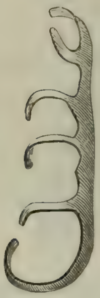
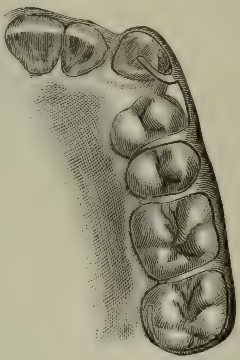


FIG. 21.



A forthpushing finger-spring of like character is illustrated by Fig. 22, both detached and in action after several days' use, and is to be followed by a device like Fig. 20, to complete the operation.

A modified Evans-Jackson crib finger-spring, made of piano-wire, is shown by Fig. 23. It will be noticed that I have added to the crib wire some neck-pieces of wire which is only .035 of an inch thick, and which is not shown of proportionate size in the cut. After securing a good plaster cast, a very fine burnisher point is used to scrape a little channel around the necks of the plaster teeth to correspond to the free cervical margin of the gum. Then short sections of the fine wire are bent to lie close in the little channels. The crib-wire is then suitably shaped and wired, or clamped to the cast close down upon the neck-wires, to which the crib is secured by a small soldering-iron. The approximate result is shown in Fig. 23, which is seen in action in Fig. 24. The spring of the crib causes the neck-wires to hug the teeth closely, and the fixture is thus firmly retained.

FIG. 22.

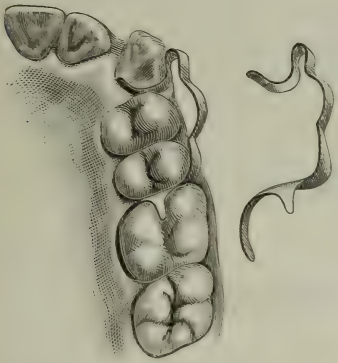
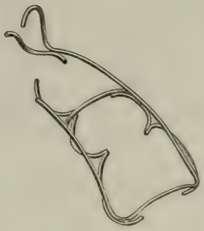


FIG. 23.



A crib and collar with a pulling spiral spring is shown by Fig. 25.

A spring-jack for push or pull action is readily made from suitable half-round wire, or by filing to half-round shape two pieces of pretty thick wire, as shown in Fig. 26. A spiral coil of fine spring-wire will then serve as a socket for the two half-round wires, and by simply touching the point of the soldering-iron to the ends of the spring they will be soldered to the thick wire, and the jack be ready for action. To increase the push power, it is only necessary to pull open the spring slightly. Attached to collars as shown in Fig. 27, it will either push or pull as desired, adjustment of spring tension being easily

FIG. 24.

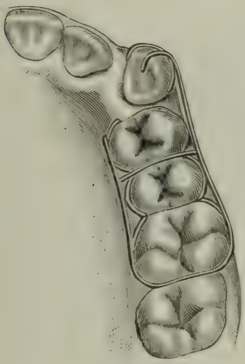
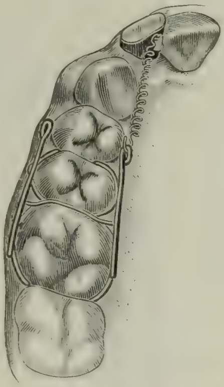


FIG. 25.



effected by a touch of the soldering-iron ; and as the springs are readily made, and kept at hand, a long or short spring can be quickly put in place. In Fig. 28, little sliding collars, such as is shown separately at A, will enable adjustments of tension to be made while the fixture is in place.

FIG. 26.

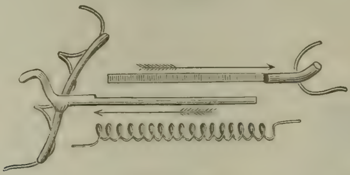


FIG. 27.

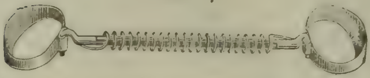
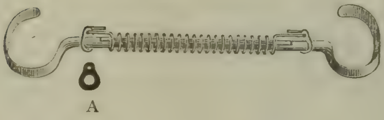


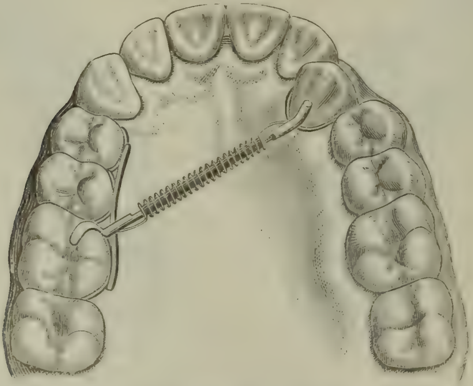
FIG. 28.



It will be observed by recurring to Fig. 26 that when the two halves of the jack are inclosed within the spring, they are firmly prevented from rotation by the contact of their flattened sides, but are free to slide forth and back as indicated by the arrows.

In Fig. 29 the device is shown in action as a pushing-jack, and the peculiar adaptation of the neck-wires for simple security of impingement without disturbance of the gum-margins is apparent. For greater security ligatures are of course applicable, and can be added without difficulty.

FIG. 29.



These spring-jacks can be made very small and short, and are therefore readily adaptable to clasps, and cribs, and plates of every kind; they can even be curved so as to act upon an arc of a circle.

With regard to the construction of regulating fixtures, the writer has at hand for future presentation some simple means and appliances which it is believed will prove practically useful.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, January 13, 1891, in the new building of the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. W. C. Deane, of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, Broadway and Ninth street, the number in attendance being ninety-two. Dr. Timme, of New York, demonstrated the use of glass fillings in buccal surfaces, where gold would be objectionable, by means of glass enamel fused on pure gold, No. 30 or 60; small inlays are made, they in turn being cemented to the cavity by the various oxyphosphates. Where the cavity extended above the gingival border that portion of the inlay was colored to match the gum. The entire work was performed without the use of any furnace, the heat for fusing the enamel being furnished by means of an alcohol lamp or burner. As an example of prosthetic and operative dentistry it cannot receive too high commendation. . . . Dr. Lowenthal, of Hoboken, demonstrated the use of a new impression cup for taking a rapid and at the same time accurate impression. The cup is hollow and has an opening at the handle into which water is injected, thus at once chilling the impression in a uniform manner. An impression taken in this way does away with the annoyance of having the cold water coming in contact with sensitive teeth. The material used may be modeling compound or wax. . . . The Ford Electrical Company, of New York, exhibited various forms of mouth-lamps, a transluminator, motors, batteries, etc.; also several varieties of conducting wires. . . . Dr. E. Parmly Brown demonstrated the use of his new asbestos medicated cement as a nerve-cap and as a lining to deep cavities under metallic fillings, by placing it in some natural teeth out of the mouth. Dr. Brown claims that the asbestos with this cement (about 25 per cent.) for nerve-capping makes it the only non-conductive cement ever made. The ordinary oxyphosphates and chlorides are very good conductors, and the phosphates especially are decidedly irritating. These cements of Dr. Brown are also medicated with carbolic acid and oil of cloves or some of the essential oils, and are thereby rendered non-irritating and antiseptic, which latter feature is very valuable for crown-setting. For ordinary surface fillings there is a small proportion of asbestos incorporated with the powder, holding it together after the manner of the hair in the plastering of walls, etc. Dr. Brown showed a lady patient with some extensive gold contour work, beneath which and over exposed nerves his asbestos cement had been placed with entire success. He also showed the use of some improved forms of the heroic chisels, and a new form of bottle for cements, which is flat, with the stopper at one end, on which bottle the cement may be mixed, and is without danger of being knocked over on the table. . . . Dr. Hasbrouck, of New York, gave a demonstration of his method of administering nitrous oxide, with some suggestions and experiences met with in practice. . . . Dr. M. L. Rhein, of New York City, demonstrated the use of chloride of methyl. He presented as a patient a young lady, wearing an upper plate carrying two centrals, who had two sensitive cavities on the anterior approximal surface, extending from the gum down on each of the laterals, the result of a badly-fitting plate. The rubber-dam was applied to each of these in turn, and, although they were extremely sensitive to the touch, by the use of a small amount of spray of methyl complete anesthesia of the dentine was produced, and the cavities excavated and filled with oxyphosphate without the patient feeling anything, as she expressed it, except the silk when tied around the tooth. In the mouth of the same patient there was nothing left of the superior left cuspid but a shell with the pulp almost exposed. Having decided to place a Logan crown in this place, the rubber-dam was applied to the tooth, and after thoroughly saturating the cavity with the methyl spray, the tooth was cut off close to the gum, and the opening into the pulp-canal slightly enlarged. All this was accomplished without the patient experiencing any sensation. According to the clinician, the difficulty of completing the removal of the pulp with the methyl was the freezing of the pulp. While the pulp was still sensitive on the outer surface, a four per cent. solution of cocaine hydrochlorate was injected, after which the entire pulp was removed without the patient experiencing the slightest sensation. The canal was then syringed with a solution of peroxide of hydrogen and bichloride of mercury, after which a dressing of cinnamon oil was introduced and the opening sealed. . . . Dr. W. S. Elliott, of Sag Harbor, N. Y., exhibited a new sand-paper disk-holder. It consisted of a mandrel having a triangular head, which pierced a triangular opening in the disk. The disk is placed over the head, and by turning it one-sixth of a revolution it was prevented from coming off, and was otherwise prevented from revolving by a collar on the back, forced against the disk by a spiral spring. The invention was exceedingly simple in its working, and was demonstrated to the entire satisfaction of the gentlemen present. Dr. Elliott also demonstrated a new matrix retainer. This consisted of a simple copper ring, which, being exceedingly pliable, was compressed to enable it to pass between the teeth. A small instrument termed a stretcher was then placed within the ring, at the labial aspect of the same, and by a screw was made to infringe upon the ring in a manner to force the folds of the matrix against the approximal surfaces of the two adjacent teeth. Thus it was held immovable until a filling was completed. If it is desired to retain the matrix *in situ* in case of an amalgam filling, it can be done in such a manner as to be entirely unobjectionable to the patient. The matrix is merely burnished down to the labial surface of the teeth, and may be removed the next day, when the filling can be completed by polishing, etc. . . . Dr. W. C. Deane, of New York, prepared a cavity on the mesial surface of a superior lateral for Dr. W. E. Andrews, of New York. After applying the rubber-dam and gaining access to the cavity by means of a wooden wedge, a spray of chloride of ethyl was thrown into the cavity from a small glass bottle having a tubular end, completely anesthetizing the parts operated upon. Dr. Andrews not being able to attend this evening, handed in the following note :

"The method of employing the chloride of ethyl used by Dr. W. C. Deane to anesthetize sensitive dentine at the clinic this afternoon, proved entirely satisfactory. The dentine of my lateral was excruciatingly sensitive, and without an obtunder I would have to endure great pain ; but I am pleased to announce that with the spray the excavating was performed by the dental engine painlessly."

The tubes as now made are too straight for general use, and Dr. Deane advises that they be manufactured of different lengths and curves to enable of more universal application. In addition, a small cap of glass or rubber should be furnished to place on the end of the tube to prevent evaporation.

Dr. W. W. Walker, of the special committee on testimonial to Dr. McKellops, exhibited to the society a solid silver loving-cup which had been secured for presentation to Dr. McKellops, upon which it was proposed to have engraved the following inscription : "Presented to Dr. H. J. McKellops, of St. Louis, Mo., by the First District Dental Society of the State of New York, as an expression of its high esteem, and as a token of appreciation of the inestimable services rendered by him as Supervisor of Clinics at annual meetings of the above society. January, 1891." (The committee were empowered to make the presentation to Dr. McKellops, on behalf of the society, and formally did so on the evening of January 21.)

Incidents of Office Practice.

Dr. Watkins. Mr. President, under the head of incidents of office practice I have been requested to describe a case which I presented at the clinic to-day. It is a case where necrosis extended from the first left superior bicuspid to the right cuspid, covering that territory between the necks of the teeth and the points of the roots, extending under the left central through to the palatal plate. When this case presented itself to me the gum was much inflamed and had a spongy appearance, with apparently little substance to it, so that an instrument could be passed through it at almost any point without causing pain. The nerve-tissue seemed to be entirely destroyed, and the entire gum was quite porous. The pulps of the left lateral incisor and the two centrals were dead. I opened those teeth and disinfected the canals, and filled them immediately; then opened the gum, and removed what necrosed bone I could get at conveniently and that which was loose, and placed some cotton in the pocket to press the gum apart, so that the remote parts of the bone could be subsequently removed. In forty-eight hours the patient returned and the gum had entirely sloughed away, from the free margin to the point of the root of the central incisor. It appeared as though a large part of the gum had been cut out with scissors. I then proceeded to remove the remaining part of the necrosed bone, which included all of the labial plate, after which the pocket was syringed out with aromatic sulphuric acid and peroxide of hydrogen. Iodoform was also placed in the pockets. I have seen the patient at different times since that operation, which was performed on the 23d day of December, and last Saturday I saw that the entire connection between the gum and the left central incisor had disappeared. I removed the floss and the oxyphosphate which formed a bridge, as it were, to secure the teeth, and I found that the gum had entirely sloughed away.

Dr. Atkinson. I am a little abashed that half a dozen men who are acquainted with this subject are not clamoring to speak about it. It is a case that is well worth studying. It is so contradictory in the statement of its history that it convicts us of being behind the attainment of the necessary knowledge to first apprehend and then comprehend the case itself and know how to treat it.

The first thing that strikes me in the testimony of the case is that in forty-eight hours the destructive changes had taken place, or could have taken place. In the first place, in the direct delineation it was stated that there was such a soft condition of the gum as to allow an instrument to be passed through without causing any sensation, and that the next time it was seen it had sloughed away entirely. That is a rapidity of retrogressive metamorphosis that I did not know anything about short of those cases in which sphacelus occurred, in very low typhoid cases, where the patients were not able to go to a dentist or to stand on their feet.

I saw the case to-day, and I made the same remark that I now make, of astonishment at the possibility of such a case as that being presented. What I do know is what I saw to-day,—that the central incisors are devoid of the support, on the labial face, of the alveolar process constituting the sockets of the teeth ; but that they are at all in such a condition as to induce or to justify any man who is at all acquainted with the treatment of such cases in advising their removal, and saying they were beyond redemption, is past belief. I was earnestly requested to use an instrument to convince me of the condition of the bone about the central incisor, which I refused to do, and gave my reason for it as being a good opportunity to show whether there was a possibility of a man's understanding conditions by looking at them ; and then I described the condition that a sight of the case revealed to me, that there were spiculæ of dead bone immediately around the margins, with new granulations springing up between them, out of which we hoped the new formation to grow, and which we did not wish to destroy by rough examinations, so that the patient might be entirely at rest, unless some new phase would be brought up to arrest the incoming of the blood through the tissues already well supplied with blood, and from which an exude would produce a clot from which to expect new tissue to be formed. I did that purposely for the instruction of those present, and to awaken their attention, in order that they might be made cognizant of the importance of studying the origin of the teeth and the mode of their nutrition, and the mode of arresting that nutrition and getting a physiological condition so as to prevent the mischief going as far as it had gone in this case.

There was one other matter clearly before my mind, and I stated it positively. It was asked if I would have burred that bone away. I judge that the case had been such that I would have previously advised the burring away of the dead bone had I seen it at that time. I gave as my reason for not advising the removal of the spiculæ then, that new tissue had already been formed between the spiculæ from the margin of the living tissue, and I did not wish to sacrifice that that was already in good condition to supply the clot which is the forerunner of all new formations of tissue. Then when I was asked what my idea would be respecting it, I said that I thought there had been an entire misapprehension on the part of those having cognizance of the matter, and I expressed my astonishment that as shrewd a mind as I knew had charge of it should have failed to see that there was already within the necrosed bone, well defined at the time, this exude from which new tissue arises.

Then there was an interest manifested as to what should be done, and I said to Dr. Watkins that the man should be treated so as to get his blood in good condition; that he lacked tone; that the cruorine, or coloring matter of the red blood-corpuscles, was not in condition to warrant our expecting a very rapid formation of new tissue, and I said I would feed him from point to point. Then the question was asked, Would you give him medicine? And I said that the kind of feeding that I had referred to would operate as medicine, by supplying the cruorine through the blood-column, so that healthy nutrition might progress visibly. Then they asked what remedies I would use. That surprised me. I said I would recommend two grain pills of nux vomica, phosphorus, and cantharides, one to be taken morning, noon, and night, and to continue them for five years,—after the first month giving two pills a day,—the object being to keep the blood-column in such a condition as to perform its functions well. It was a very interesting case, and if we could have had all this society present we might have had a very nice little dance as to what molecular metamorphosis is. We do not want to speak about it until we have studied very thoroughly what the changes are that constitute the preparation of the food so that it can be converted into chyme, chyle, blood, protoplasm, and embryonal tissue, according to the demands in the system all the way through. This has been befogged by the jaw-breakers used by those naturalists who study these metabolic changes, where each stage is merged into a further and further ripening process, so as to have the material out of which to get well-formed elements of the organs of the body, so that normal and vigorous function may be supplied for the support of the system thus serving the function of a uterus, in which a clot is formed out of which new growth in serial order is produced, restoring the part so exactly after the type of the original structure that it would be difficult to detect that it was not part and parcel with the structure which had been destroyed.

Dr. Rhein. One question. I saw some spiculæ of bone that Dr. Ottolengui removed. I did not make very long or careful examination, but the spiculæ that I saw was distinctly carious bone, and I was under the impression, for that reason, that it was a genuine case of carious tissue, as distinct from pure necrosis. I was somewhat surprised by Dr. Atkinson's statement, and I would like to ask if he saw any of the spiculæ that were removed.

Dr. Atkinson. No, I did not need to. You cannot be more surprised than I am at the question asked. How do you make a distinction between necrosis and caries?

Dr. Rhein. Necrosis is that condition where there is an entire death of the parts. Caries is a condition where there is some vitality left in them.

Dr. Atkinson. That is simply pitiable, to come from a scholar and a histologist. Caries is simply necrosis of the superficial layer of bone-corpuscles. Necrosis is where a large mass of dense bony structure is deprived of its nutrition, and that has life enough to carry on the process of inflammation so as to set up a line of demarcation and make a distinct differentiation between the sequestrum and the living part. That is the only difference I know of. After the bone has been removed I know of no other way of determining whether it is necrotic or not than cutting it so as to get at the bone-corpuscles; and if we find empty bone-corpuscles by deprivation of the soft solid in which nutrition holds its court, we know then that it is necrotic, or a dead corpus. I deny that spiculæ ever come from caries, which is simply a solution of the superficial layer of the corium of the bone that lies immediately under the periosteum.

Dr. Rhein. I am the last person in the world who would like to get into a discussion on a scientific question with Dr. Atkinson, because of the very high opinion I have of what he has done in these matters; but I can see very little difference between his own definition and the reply that I gave him, that the difference between carious bone and necrosed bone was that in carious bone the vitality had not all left the part, while in necrosed bone the vitality was wholly destroyed. He says that caries is superficial death of the part. I admit all that. In this case a small piece of bone came away; I was told Dr. Ottolengui had removed it, but there was distinct evidence in that bone of nutrient activity, and that evidence was the blood-supply.

Dr. Atkinson. Was it cut and put under the microscope?

Dr. Rhein. It was so evident that that was unnecessary. You cannot call a piece of bone necrosed until it is entirely dead. It is not necrosed till every vestige of vitality has left it. There may be a question in this case, but I was more inclined to believe this bone was carious than necrosed because I could not notice any distinctive line of demarcation set up. The point of difference I had with what Dr. Atkinson said about it is that until the bone is entirely necrosed and has set up a line of demarcation and is ready to come away it is not a piece of necrosed bone. Necrotic action may have been set up in it. It is in a stage where it is very difficult to determine, especially in the alveolar process and the cancellous tissue of the maxillæ, whether we are going to have true necrosis. I have seen a great many cases of carious bone around the sockets of the teeth, but very few cases of necrosed bone in that location. The irritation around the roots of teeth does not seem to be, as a rule, sufficient to set up a line of demarcation and cause true necrosis to set in. The examination I made in this case was not thorough enough to enable me to be positive, or to make a positive diagnosis, and it is possible I may have been mistaken.

Dr. Atkinson. It is a very painful thing for me to stand in the position I do in regard to that matter, and to hear such a display of utter misapprehension of the nature of the case. He said he had not seen any place in the spiculæ where there was a line of demarcation between the necrosed and the healthy part of the bone. The spicula itself shows there was a line of demarcation, or he could not have taken it away.

Dr. Rhein. It was broken away.

Dr. Atkinson. Then it would only resolve itself into a question of verbiage over what we shall call caries.

Dr. Heitzmann. I am sorry to have to contradict my old friend Dr. Atkinson, and in a measure support what Dr. Rhein says. Caries is ulceration; necrosis is death. Dr. Atkinson is surely right if he claims that both are processes of killing the tissue. Caries kills it gradually from the surface down; but necrosis at once invades the larger part of the tissue and kills it at once, in consequence of cutting off the supply of blood. In caries we have a slow death, a gradual sloughing upon a basis not entirely devoid of life, whereas in necrosis there is abrupt and sudden death of a certain amount of tissue.

Dr. B. F. Luckey. Mr. President, I want to find a little fault with Dr. Watkins's statement of that case. I cannot conceive why a man at all familiar with such cases should not have removed at once the dead tooth, imbedded in dead tissue, and the dead tissue also. I cannot see any reason why there should be an effort made to restore to healthy activity, or to bring about nutrient activity in parts that are apparently dead, by tying up the teeth and treating them. The prompt use of the forceps would be better practice. I understand that the labial plate was necrosed from the left superior bicuspid to the right cuspid, as well as the palatal plate under the left central incisor; there was a clear area of necrosed tissue around that central, and what reason there was for ligating that tooth and attempting to keep it *in situ* I cannot understand. If such a case were to present itself in my practice I should without hesitation remove every tooth that was imbedded in dead or necrosed tissue. That would be my first effort. Then I should remove all the necrosed tissue that was loose, or where a line of demarcation had been established. Then I think treatment with sulphuric acid would be sufficient to stimulate the parts to throw out new granulations and bring about a condition of health.

Dr. Watkins. Mr. President, in answer to Dr. Luckey's statement that inasmuch as these six teeth were all in dead tissue, certainly on that labial surface, he would extract them, I will say that on that left side, over the left lateral, cuspid, and bicuspid, new granulations are being thrown out now, and the gum is adhering beautifully to them; and I do not think there is a doubt but that the cuspid and bicuspid will be saved. It is probable that the lateral will be lost. I think there is a probability that new tissue will be built up over the lateral and the central on the right side. So it seems to me that it would have been a great waste of human teeth to extract them as Dr. Luckey advises. It does not do any harm to try to save them, even though we fail.

Dr. Luckey. Dr. Watkins labors under a wrong impression as to my position. I think I said clearly that, there being an area of dead tissue surrounding the central incisor, I should remove without hesitation any tooth that was imbedded in dead tissue. My remarks were not intended to include the other teeth that were already attached to the healthy palatal plate of the process, but only to one tooth that I understood was surrounded by dead tissue.

The President. We will now listen to a lecture by Dr. Carl Heitzmann upon Professor Ebner's researches in enamel.

Dr. Heitzmann. Mr. President, in the last year I have spent seven months in Europe, trying to get the advantages of their science and wisdom and to learn as much as possible. I could not help, however, staying in Vienna, in the old wigwam of my own medical education, for two months, owing to the fact that I had to alter and improve a new edition of my anatomical atlas. The first man on whom I called was my dear old teacher, Professor Stricker, and he surprised me with a micro-photograph, made with the assistance of the electric microscope, of a colorless blood-corpuscle of a certain species of newt, magnified with a power of twenty-five hundred diameters, almost two inches in diameter, a photograph in which there is the much-mooted and doubted reticulum well represented. This will be the topic of an address before the Odontological Society, where doubts have recently been expressed as to the existence of this reticulum.

I went next to see Professor Ebner, the successor of Professor Wedl, who, as you know, has done so much in dental histology and pathology. Professor Ebner has a fair repute as a histologist, otherwise he certainly could not have filled the chair of histology in Vienna. He told me that he was engaged in the examination of the dental tissues, owing to the fact that a German cyclopedia, similar to ours upon dental science, was in progress, and he was invited by the editor, Dr. Scheff, to write an article on dental histology. Professor Ebner presented me with the pamphlet which is before me, with his kind regards, and I am about, gentlemen, to explain to you the contents of this pamphlet. It is exactly one year old, having been presented on the 23d day of January, 1890, to the Vienna Academy of Sciences. There are seven different chapters, all dwelling upon the minutiæ of the structure of the enamel. I will speak only of a few of the most important points; first of the chapter which refers to the brown parallel lines that we not infrequently see in the enamel of the teeth. Most of you have seen teeth which exhibit such lines within the enamel,—peculiar striations, which run a more or less parallel course, being of a deep brown color and quite symmetrically arranged in the enamel, without causing the least interruption in the course taken by the enamel-prisms themselves. These brown striations were first described by Retzius in 1837. This unprejudiced observer held the opinion as to their nature, that they are either due to the devious course of the enamel-prisms, or to the pigmentation of the enamel-prisms themselves. The peculiarity of these brown striations is that they are most intense at the surface, and at the outer line of demarcation, directed toward the surface of the enamel, gradually fading, as a rule, downward and toward the dentine. We notice wherever such striations are visible,—never in temporary, but always in permanent teeth,—peculiar interruptions or ridges upon the enamel surface, and the deepest stain always corresponds to the upper border of the ridge, so much so that the impression is conveyed of a formation of enamel in layers, being in close connection with the development of the enamel. If we make transverse sections through the enamel we see concentric but uninterrupted brown lines. Dr. Ebner tries to explain the nature of these brown striations in a peculiar way. First he says that the best chance to see the brown striations is offered by the examination of dried teeth ground thin. He comes to the conclusion that the striations are due to the presence of air which has penetrated through the surface into the interior of the enamel and has passed into and around certain prisms; for the brown color, he says, disappears by treatment with a heated solution of caustic potash; whereas deep brown stains resist boiling in water, continued even for days. He bases his opinion that the brown striations are caused by the penetration of the air, upon the supposed fact that in ground sections of the enamel, made immediately after the removal of a tooth, kept moist during the process of grinding and immediately mounted and examined, the striations are not visible at all. Now, gentlemen, I saw such striations in goodly numbers, some five years ago, when Dr. Frank Abbott was in my laboratory studying the enamel. I have never considered the brown striations as normal. It is an anomaly the cause of which we are at a loss to thoroughly explain. But the fact is that in some teeth they are crowded, and very dark; in others faint and scanty, and in the majority of specimens of enamel they are missing altogether. The fact is, moreover, that Dr. Abbott never, at least to my knowledge, has ground a dried tooth, but on the contrary has always, from the very beginning of the procedure, kept the enamel slabs moist, and yet there were seen plain and sometimes dark brown lines, the striations which Ebner claims to be invisible under such circumstances. How shall we explain the assertion from an otherwise sensible man that he could not see such striations in teeth kept moist from the very beginning? I do not see any other way to explain this peculiarity than to say that the brown striations are not present in every tooth. It so happened, very probably at least, that Professor Ebner got hold of dry teeth with marked striations in their enamel and which he ground, whereas, accidentally, I believe, those teeth that he kept moist had no striations, or only a few of them.

Professor Ebner attacks myself and Dr. Bödecker for having urged it as important to never examine dry teeth. He quotes me as having said a dry tooth is a mummy, a remnant or frame of a previously living object in which unquestionably the lime-salts and the basis-substance are present, but all the soft parts that have been the seat of life must have shriveled up and disappeared. For this reason I would never advise the examination microscopically, as regards the minutiæ of their structure, of dry teeth. Dr. Bödecker in the article that he published in the DENTAL COSMOS thirteen years ago upon the structure of the dentine and the enamel, recommends the softening of the dentine by means of chromic acid. He distinctly says that this method is the best for the microscopical examination of the dentine. Professor Ebner has misunderstood this assertion, apparently, although my book has laid before him, and quotes Bödecker as having recommended the chromic acid treatment for the microscopic examination of teeth generally. I at once told Ebner that he had made a bad mistake. Bödecker advised chromic acid treatment for the dentine, eventually for the cementum, but not for the enamel; since we know too well that there is no way at all to soften the enamel to a point where it can be cut with a razor. For the examination of the enamel there is unquestionably but one method to use, and that is grinding the teeth; but you have to keep them moist by placing them in an indifferent medium such as a one or two per cent. solution of salt water. Pure water would spoil everything. Therefore I must take exception to the quotation of Professor Ebner. A study of the pamphlet which I have here to-night will plainly show that Dr. Ebner did not read the article he quotes from all through, but only parts of it. He quotes a few remarks of Dr. Bödecker, but does not go through the whole description of the enamel, as he ought to have done in order to do justice to the subject and to Dr. Bödecker.

One would think that the brown striations under consideration, being always in connection with ridges at the surface corresponding to the upper border of the ridge, would necessitate their development in layers, as Retzius, in 1837, already thought. Professor Ebner denies that, for the simple reason that these layers are not running all around the crown of the tooth, and he takes them to be ribbon-like formations irregularly distributed in the enamel. I fail to see why that is any reason to prevent us from assuming that the brown layers are clearly indicative of the formation of the enamel in layers at different times. As you may remember, Dr. Abbott announced a theory to explain the deposition of enamel in successive layers. Enamel, as originally formed, is a small affair, in the temporary as well as in the permanent teeth. We know that in the temporary teeth there is at birth only a minute cap of enamel, and the whole enamel-organ is used up for the production of this cap. It is very much later, and takes years, perhaps, before the enamel is perfected in the way of gradual deposition and stratification. Dr. Abbott suggests that the original layers formed out of the enamel-organ are the crown layers; whereas the layers which are set up afterwards are the neck layers. It seems to me that since the external epithelium, from which neck layers are being formed, breaks up into a medullary tissue with large masses of blood-vessels and blood, the presence of coloring-matter of the blood has something to do with that brown discoloration seen along the borders of the neck layers. I do not hesitate to accept the old-fashioned view, as Abbott did, that the brown stratifications under consideration are caused by a pigmentation of the enamel-rods themselves.

The second topic which Professor Ebner enters upon is the discussion of the peculiar fact that the enamel-rods in certain conditions, especially if treated with acids, such as hydrochloric or nitric acid, are broken up into square pieces, having the appearance of a ladder. You all know that in the pictures of John Tomes and others the enamel-fibers are represented in the first place as lying close against one another, and in the second place as being made up of peculiar square pieces. These pieces are not plainly visible in the enamel of fully developed, but are always marked in temporary teeth. We know that the enamel of the latter contains about twenty per cent. of organic matter, whereas the enamel of adult teeth has not more than from two to four per cent. In freshly-ground temporary teeth we see these peculiar squares, like separate layers; in full-grown and developed teeth we do not. If you add to a thin slab of any enamel some six per cent. acetic acid solution you will observe that square pieces are brought forward; at the same time interstices are left, which under our very eyes grow larger, whereas the squares themselves grow smaller until they completely disappear. By the acid the lime-salts are dissolved out, and, especially in temporary teeth, there is left a good deal of organic material retaining the original shape of the enamel-prism.

The discussion was at one time rather active as to the nature of the transverse striæ, and Professor Ebner declares his conviction that the striæ are caused by the action of the acid only. He says there is a peculiar way in which an acid reaches the enamel-prisms and penetrates between certain transverse lines easier than from their sides, thus dissolving the lime-salts gradually from the periphery towards the center of each square piece, until the squares would disappear. Professor Ebner undoubtedly is right in a measure. In order to obtain plain views of square pieces of enamel-rods you may resort to the action of hydrochloric acid, but he is mistaken in denying the existence of such transverse sections in fully-developed enamel. If you examine a fresh, thin slab of enamel you will not fail to see the transverse sections, even before the addition of an acid. You will remember, perhaps, that the presence of such sections was a strong point for Bödecker in maintaining that the enamel was not a mere crystal or coat of mail, but really an active, living tissue, which contains fine fibers of living matter, not only alongside the enamel-rods but also transversely connected. Later Dr. Abbott found that pieces which apparently are solid lime are traversed by a reticulum of living matter, rendered visible after the solution of the lime-salts.

Now, gentlemen, what are these striæ from? Professor Ebner comes to the conclusion that they are artificially produced, which I deny. You recollect what Bödecker has said, that the ameloblasts, those peculiar elongated bodies which you see apparently rising from the internal epithelium of the enamel-organ, do not directly produce the enamel, but that the ameloblasts, the same as the odontoblasts, are merely provisional forms, and will, before calcification takes place, break up into protoplasmic bodies. These latter being arranged in rows, by flattening one another produce the appearance of a rod or prism, or enamel-fiber. In the meshes of the reticulum of protoplasm will be deposited lime-salts, whereas between the bodies are left some unaltered portions of living matter in a thread-like arrangement. This Professor Ebner ignores. He does not know, perhaps does not want to know, the history of the development of the teeth, published after eight years of hard work by myself and Dr. Bödecker. The consequence is that the peculiar striations under consideration remain to him a puzzle, as they are to all those who do not know that every enamel-prism is built of a series of flattened protoplasmic bodies, in which a deposit of lime-salts takes place, whereas the living matter generally remains as an extremely delicate net-work throughout the enamel, and in shape of beaded filaments between the enamel-rods.

Another point that Professor Ebner discusses is the alternating fields of apparent decussation, very superfluously called Schreger's fields. You know that when you look at a specimen of ground enamel you often see longitudinal bundles of prisms alternating with transverse sections of such prisms. Whenever we cut through enamel, in which the rods run a straight course, transverse sections of prisms are lacking; whereas whenever the bundles of prisms run a markedly wavy course, across the fields in which you see the prisms cut longitudinally, there are bundles of prisms cut transversely in varying numbers.

After a careful study of enamel-sections Dr. Abbott, some five or six years ago, declared that the old-fashioned view of decussation of the enamel-fibers is a mistaken idea, and that the bundles of enamel-fibers mostly running a wavy course, show alternating longitudinal and transverse sections. We have to take into consideration the fact that the enamel-prisms, in most instances, are put up in wavy bundles, and we at once realize that in making a section through them we reach the same bundles of enamel-rods both longitudinally and transversely. This assertion Dr. Abbott has based upon the fact that we see these peculiar transverse sections very distinctly and in large numbers wherever they are wavy and pigmented in an anomalous degree. I think this fact was also ignored by Professor Ebner.

I omit a few unimportant chapters, and proceed to chapter vi, in which the question is put, Do the enamel-rods lie close against one another, or is there an intervening substance between them? If you look over the literature of the enamel, going back to Retzius in 1837, and taking in John Tomes, who is an admirable observer, you will always see the enamel-rods pictured in close contact with one another. Thirty years ago I made the drawings for Professor Wedl's atlas of the pathology of the teeth, which is issued now in a new, enlarged edition, and having at my disposal only low powers of the microscope, likewise drew the enamel-rods in contact with one another. The first man to maintain that there is an intervening substance between the enamel-prisms was Dr. Bödecker, thirteen years ago. Bödecker saw, in my laboratory, the interstices between the enamel-rods distinct enough to admit of saying that the prisms are not in close contact with one another. Bödecker, as you will presently hear, maintains more than that. When, some eight years ago, Professor Wedl of Vienna came to this country and to my laboratory, I showed him enamel-sections and he exclaimed with surprise, "Why, there are interstices between the enamel-rods." "Yes," I answered, "but who says that? You don't. Neither is there in your atlas the least indication of interstices between the prisms." It was Bödecker who first announced the presence of such interstices. And now comes

Professor Ebner of Vienna, and says there are interstices between the enamel-prisms. And when I asked him, "Do you know who is the man who first has said so?" he began to think and did not give me any answer. But all these facts were published in my book, "Microscopical Morphology," edited also in German in 1883. So it happens that instead of doing justice to Bödecker, Ebner put it as his own discovery,—not saying it is original either, but ignoring Bödecker's discovery entirely. The most interesting part of it is this: You know that the surface of the forming tooth is surrounded by what is called Nasmyth's membrane. It means a cuticular homogeneous-looking layer, which is the outcome of previous epithelium, about the origin of which at present I do not wish to say anything. Professor Ebner claims that the interstices between the enamel-prisms contain a substance which is continuous with the outer cuticular layer, and he says if you apply dilute hydrochloric acid you can make the substance which fills the interstices disappear completely, whereas the cuticular formation may linger for a while yet, from which fact he concludes that the cuticular layer is not identical in its nature with the substance present in the interstices between the enamel-prisms.

The seventh and last chapter is most interesting, since it dwells upon the minute structure of the enamel. You know, gentlemen, that Dr. Bödecker has claimed that this interstitial substance is hollowed out, carrying in its interior a beaded fibril of living matter, and that the fibrils are interconnected by lateral offshoots crossing the enamel-prisms. I should mention that after Bödecker made this discovery thirteen years ago in my laboratory, I did not admit it until I had gone through long-continued examinations. At last I became thoroughly convinced that these fibrils exist in the enamel of temporary as well as of permanent teeth. Dr. Abbott's researches prove even more than that, viz: the existence of a delicate reticulum throughout the square pieces of the enamel-prisms. Bödecker was undoubtedly the first to maintain that the interstitial substance is hollow and contains fibers of living matter. The fibers, of course, could not be a topic of observation by Professor Ebner, for the reason that he only examined dry enamel. Such a delicate formation of living matter must necessarily shrink and fall away in dry specimens. But Professor Ebner claims that in certain marsupialia there are canaliculi running in the interstitial substance between the prisms. The most striking picture he gives is a transverse section of the enamel-prisms,—the interstitial substance is shown around the angular fields of the prisms, and at their corners the canaliculi, corresponding exactly with what Bödecker called the enamel-fibers. When I saw the specimen I was really happy, because it gave the strongest corroboration of what Dr. Bödecker had said years ago, an assertion which you will remember met with and does still meet with bitter opposition. There are dental histologists who look upon the enamel as nothing but a coat of mail, whereas Bödecker has shown that it is a tissue, endowed with properties of life beyond doubt.

In these animals, however, the dentinal canaliculi are continuous with the canaliculi of the enamel, therefore there might be doubt as to their independence in the latter tissue. Professor Ebner made researches in the teeth of some rodentia, especially the mouse and squirrel, in which there is no connection between the dentinal canaliculi and those of the enamel. Still he contends the canaliculi are plainly visible in the enamel. When he showed me these specimens of enamel I said that they did not prove anything new to me, for if you examine specimens of human enamel you will see the same thing. And so it was. There were exactly the same forms as seen in the enamel of marsupialia. For some reason Professor Ebner declined to accept my view.

Why did I bring this topic before you? For this reason: We here in the United States are in many respects far ahead of the Europeans. Although traveling seven months through Europe and seeing pretty nearly all the countries of culture, I had a longing for the United States. I know some Germans ignore systematically and misrepresent what we are doing. When this German Cyclopedia of Dentistry will appear I am sure there will be dozens of Americans running to translate it, instead of producing something novel and making original researches. What I wish to say to you is, let us go ahead; don't translate; don't chew the cud; but do original work. We do not need to copy from Europeans; we are independent of them. We can boastingly say we are ahead of them twenty years.

Dr. Carr moved a vote of thanks to Dr. Heitzmann for his interesting address. Carried.

Dr. Rhein exhibited the chloride of methyl spray apparatus, the use of which he had demonstrated at the afternoon clinic.

Adjourned.

B. C. Nash, D.D.S., *Secretary.*

SAN FRANCISCO DENTAL ASSOCIATION.

At the October (1890) meeting of the San Francisco Dental Association it was

Resolved, That this association indorse the methods of Dr. Crouse in conducting the Dental Protective Association, and strongly urge every dentist of the Pacific Coast to become a member of said association.

Thos. N. Iglehart, *President.*
Chas. E. Post, *Recording Secretary.*

THE ISAAC KNAPP DENTAL COTERIE.

THE dentists of Fort Wayne, Ind., have organized a local society, to be known as The Isaac Knapp Dental Coterie. S. B. Hartman, A.M., D.D.S., was elected president for the ensuing term, and M. A. Mason, D.D.S., secretary. The society meets the first and third Tuesday evenings of each month.

M. A. MASON, D.D.S., *Secretary.*

MARYLAND STATE DENTAL ASSOCIATION.

THE eighth annual meeting of the Maryland State Dental Association, recently held at Baltimore, elected the following officers for 1891:

Cyrus M. Gingrich, president; B. Holly Smith, first vice-president; Bernard Myer, second vice-president; F. F. Drew, corresponding secretary; W. W. Dunbracco, recording secretary, and T. H. Davy, treasurer. Executive Committee: C. C. Harris, Jno. C. Uhler, and G. Marshall Smith. A resolution was adopted to include the name of Horace H. Hayden in the memorial about to be established to the memory of Chapin A. Harris.

W. W. DUNBRACCO, *Recording Secretary,*
1023 Edmondson ave., Baltimore, Md.

ODONTOGRAPHIC SOCIETY.

THE annual meeting of the Odontographic Society was held in the parlor of Library Hall, Pittsburg, Pa., January 22, 1891.

The following officers were elected for the ensuing year: F. S. Whitsler, president; W. F. Fundenberg, first vice-president; W. A. Kessler, second vice-president; W. H. Fundenberg, secretary; W. A. Lee, treasurer; H. L. Reinecke, librarian; J. S. Goshorn, C. J. Phillips, and L. Depuy, censors; W. F. Fundenberg, Geo. Shidle, and C. B. Bratt, executive committee.

W. H. FUNDENBERG, *Secretary,*
No. 958 Penn avenue, Pittsburg, Pa.

KANSAS STATE DENTAL ASSOCIATION.

THE twentieth annual meeting of the Kansas State Dental Association will be held at Wichita, commencing Tuesday, April 28, 1891, its sessions to continue for four days.

A cordial invitation is extended to the profession to meet with us.

C. E. ESTERLY, *Secretary,*
Lawrence, Kansas.

NORTHERN OHIO DENTAL ASSOCIATION.

THE thirty-second annual meeting of the Northern Ohio Dental Association will be held in the Y. M. C. A. Building, Oberlin, O., commencing Tuesday, May 12, 1891, at 10 A.M., its sessions to continue for three days.

HENRY BARNES, *Cor. Sec.*, Cleveland, O.

VERMONT STATE DENTAL SOCIETY.

THE fifteenth annual meeting of the Vermont State Dental Society will be held at the Bates House, Rutland, Vt., commencing Wednesday, March 18, 1891, the sessions continuing for three days.

A cordial invitation is extended to all members of the profession to be present.

THOS. MOUND, *Secretary*,
Rutland, Vt.

MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS.

THE forty-eighth annual meeting of the Mississippi Valley Association of Dental Surgeons will be held at the Lincoln Club Rooms, Cincinnati, O., commencing March 10, 1891, the sessions to continue three days.

For further particulars, address

DR. J. R. CALLAHAN, *Chm'n Com. of Arrangements*,
No. 78 W. Eighth street, Cincinnati, O.

ALABAMA DENTAL ASSOCIATION.

THE twenty-second annual meeting of the Alabama Dental Association will be held in Anniston, Ala., commencing April 9, 1891.

The board of dental examiners will be in session at the same time.

Extra efforts have been made for a number of clinics. All who have anything for the good of dentistry or its advancement are cordially invited. Reduced rates will be given by the local hotels.

R. C. YOUNG, *President*, Anniston, Ala.

IOWA STATE DENTAL SOCIETY.

THE next annual meeting of the Iowa State Dental Society will be held in Sioux City, during the first week in May, from the 5th to the 8th inclusive, 1891.

An effort is being put forth to make the meeting one of the best in the history of the society. All are invited.

GEO. W. MILLER, *Secretary*, Des Moines, Iowa.

MINNESOTA STATE BOARD OF DENTAL EXAMINERS.

A MEETING of the Board of Dental Examiners of the State of Minnesota, for the examination of candidates for license, will be held in Minneapolis on Tuesday, April 7, 1891.

H. A. KNIGHT, *Secretary*,
608½ Nicollet avenue, Minneapolis, Minn.

COMPLIMENTARY BANQUET TO THE PATRIARCHS IN DENTISTRY.

THE banquet in honor of the patriarchs in the dental profession, which was held in New York city on the evening of January 31, was a great success, and reflected credit on all of the committee, and especially upon Dr. Norman W. Kingsley, who conceived the idea in the first place, and ably carried out his share of the work, which included presiding at the dinner. The affair was under the auspices of the five societies in and around New York city: The Central Dental Society of Northern New Jersey, the Odontological of New York, the Brooklyn Society, the First District and the Second District Societies. The committee in charge were Drs. Levy, Meeker, Adams, Mirick, Perry, Brockway, Hill, Pitts, Jarvie, Campbell, Walker, and Remington, besides Dr. Kingsley, chairman; Dr. Northrop, treasurer, and Dr. Ottolengui, secretary. The guests of the evening who were present were: Drs. John B. Rich, Washington, D. C.; Jesse C. Green, Spencer Roberts, and C. A. Kingsbury, Philadelphia; I. J. Wetherbee, Boston; T. H. Burras and W. B. Hurd, Long Island; A. D. Newel and I. Hayhurst, New Jersey; Jere A. Robinson, Michigan; A. I. Volck, Baltimore; John Allen, W. H. Atkinson, W. H. Dwinelle, S. A. Main, and L. S. Straw, New York.

The following accepted, and were prevented from attending: Elisha G. Tucker and Ambrose Lawrence, Boston; Finley Hunt, Washington; W. W. H. Thackston, Virginia; C. W. Spalding, St. Louis; and Augustus W. Brown, New York.

Those who were invited but declined were: Drs. Edward Maynard, Washington; Edwin I. Dunning, Newton Center, Mass.; J. De Haven White, Daniel Neall, and Edward Townsend, Philadelphia; R. C. Mackall, Maryland; J. Smith Dodge, Morristown, N. J.; A. W. Kingsley and I. F. Fowler, of New Jersey, but spending the winter in Florida; I. H. Farnsworth, Warren, Ohio; L. W. Bristol, Lockport, N. Y.; E. D. Fuller, Peekskill, N. Y.; B. W. Franklin, Ithaca, N. Y.; and W. A. Royce, Middletown, N. Y.

One hundred and eighty persons sat down to dinner, and owing to judicious arrangement by the committee all were seated in the proximity of acquaintances, which made the evening doubly enjoyable.

The feast ended about nine o'clock, and then followed the speeches. There were no toasts. After a brief explanation of the origin and purpose of the entertainment, Dr. Kingsley introduced Dr. Marvin to make an oration of welcome in the following courteous manner : "We have secured for this occasion, and for one night only, the services of the most brilliant, eloquent, and silver-tongued orator in our profession, to make an address of welcome to our honored guests. He has had his silver tongue polished up expressly for this occasion. When I say that he is the most fluent and graceful speaker among us, it is not necessary for me to mention his name, for you all know that I mean Dr. Marvin.".

Dr. Marvin was greeted with a storm of applause, which lasted so long that he must have felt greatly honored. He delivered a most eloquent eulogy upon the services rendered by the pioneers, and his beautifully phrased sentences brought forth numerous outbursts of merited applause.

Perhaps the most enjoyable feature of the evening was the humorous tilt between Dr. Kingsley and Dr. Hurd. Before introducing Dr. Hurd, Dr. Kingsley said,—

"Gentlemen, we have heard of you for so long that your origin is involved in mystery. We know not from whence you come. We have heard that you assisted at the creation. We have heard also that in the Eocene Age, when the morning stars sang together, you were there and joined in the chorus. We have heard that you are the identical men who planted the big forest-trees of California, more than six thousand years ago. We have heard that at the time of the flood you tried to get into the ark, and couldn't, and that then you went off and built a little ark of your own and called yourselves an 'Independent Profession.' When the people in the ark saw what speed and progress you were making, they became envious and made overtures to you to become their tug-boat and tow the 'International Ark' along. But I will introduce Dr. Hurd, of Brooklyn, who will tell us the truth of this story."

The following is a synopsis of Dr. Hurd's rejoinder, which was received with boisterous laughter :

"One of the best evidences of old age is loss of memory, and when Dr. Kingsley tells you that we tried to get into the ark he shows loss of memory, for he was there himself. He has made just enough reference to the ark to be unsatisfactory, and in defence of these, my fellow approximate octogenarians, I think I ought to tell the story of the ark. It is not necessary to deny that we were there, and as sure as we were there, Dr. Kingsley was there ! As we stood upon the bank looking upon that great sea monster, the ark, I heard a terrific puffing and blowing, and looking over my shoulder I saw the doctor with flushed face, distended nostrils, and rapid strides making for the ark. Just at that moment I heard the stentorian voice of old Noah sing out, 'Haul in that gang-plank!' You would have pitied our archæologist doctor if you could have seen his face, as old Noah, looking over the side of the vessel, said, 'We can't take *everything!*'"

The doctor then became reminiscent and eulogistic, withal keeping near enough to the humorous to make his speech one which will live in the minds of his hearers as one of the pleasantest incidents of professional conviviality.

After Dr. Hurd, a toast was drunk standing in honor of Dr. T. H. Burras, who responded in language that showed that he is nearly as young in vigor as any who were present. Dr. Rich spoke eloquently, referring in glowing terms to the work done by those pioneers of dentistry, Drs. Hayden, Harris, Parmley, and Baker.

A letter of regret was read from Dr. Elisha G. Tucker; and Dr. L. D. Shepard, of Boston, spoke for Dr. Tucker, and also referred in terms of praise to Drs. Joshua Tucker and Harwood. Interesting speeches were also made by Drs. Kingsbury, Wetherbee, Dwinelle, John Allen, and Straw. Drs. Main and Atkinson were called for, but they had retired, the hour having grown late.

Altogether, the banquet of the patriarchs will live in dental history as a well-timed tribute to long and faithful service. A full report of the dinner will be printed in pamphlet form, and distributed among the guests as a souvenir of the occasion.

EDITORIAL.

A PROFESSIONAL PROBLEM.

SINCE the issue of the February number of the DENTAL COSMOS, which contained an editorial upon "Secret and Patented Local Anesthetics," we have received from subscribers in different sections of the country copies of newspapers containing the following advertisement:

"DR. R. I. HUNTER:

"*Dear Sir,*— I have used your obtundent, for sensitive dentine, and local anesthetic for tissues, since August, and I have not had a single failure to produce the desired result. I regard it as the only safe, sure, and reliable dues Hectic* extant."

To this is appended the name of a prominent dental practitioner, which we omit in order that the discussion of the subject may not be open to the charge of personality. We certainly have no motive in again referring to the matter other than to call attention to what appear to us to be serious errors.

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* Probably a typographical error, "anesthetic" being meant.

Our readers will remember that, as stated in the editorial referred to, the compound thus indorsed contains about one grain of arsenious acid to every twenty drops of the liquid; that the bottles containing it are without label of any kind; that it is stated on the wrapper that "You can use as much as you like with no bad results. It is perfectly harmless"; and that it is even recommended that mothers should keep it in the house to use in stopping the little ones' teeth from aching. The paper envelope in which the bottle is contained bears only the following information as to the character of the agent:

"*Hunter's Latest Improved Nonechorotic* Obtunder or Dental Anodyne for Sensitive Dentine.*"

We have the personal assurance of the patentee that the compound as sold is made after the formula given in the patent. Comparatively few, however, of those who are expected to use the preparation in their practice have any opportunity of learning anything about its constituents, and many will doubtless be led to employ it through written and published indorsements such as that quoted, who would not think of doing so if aware that the anesthetic, obtundent, or anodyne effect obtained was due principally to the arsenious acid which it contains.

It would seem that no intelligent practitioner would be likely to use any preparation whatever where the vitality of a pulp might be jeopardized, without knowledge of its constituents; but we fear many will do so solely through faith in the names appended to such certificates.

If the writers of these indorsements have positive convictions as to the safety of arsenic as an obtundent of dentine, they should place themselves on record as believing in and advocating its employment; and unless prepared for such open advocacy, they certainly should not lend their names to indorsements of its safety.

It may be urged that these indorsements were probably given in ignorance of the composition of the agent; but how, then, could the writers feel at liberty to assure their fellow-practitioners and the public that it was "safe, sure, and reliable"?

It may also be urged that, by the combination of the several ingredients, a chemical change is effected by which the arsenious acid loses its distinctive properties so that it no longer acts as arsenic. But no valid reason can be given why such change should occur, and a simple chemical test shows the presence in quantity of arsenious acid as such.

We were under the impression that the employment of arsenious acid as an obtundent to sensitive dentine had been entirely abandoned as dangerous to the vitality of the pulp. Certainly many instances of discolored teeth have been, justly or otherwise, attributed to the employment of arsenical preparations as obtundents. If, however, the safety of the use of arsenious acid for such purpose is still an open question, its employment should assuredly be based on a conviction of its innocuousness.

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* Non-escharotic was probably intended.

Underlying this whole subject is the question whether it is according to professional ethics to give professional indorsement to either secret preparations or, which is substantially the same thing, to a compound which, though patented, and therefore open to those who take the trouble to ascertain its character, is vended to the profession and to the public alike without any information as to its constituents.

The profession will await with interest the explanation of the indorsers of this "latest improved nonechorotic obtunder" as to whether they advocate the employment of arsenious acid for the obtunding of dentine, or whether they gave their indorsements in ignorance that the compound pronounced "safe, sure, and reliable" contained arsenious acid in notable quantity.

We have but one further suggestion to offer, and that is that those who have purchased the "obtunder" should try its efficacy in the devitalization of exposed pulps. We have already had a report from a prominent Philadelphia practitioner that, acting on our suggestion, he had applied it for this purpose in two cases with satisfactory results.

DENTAL ANODYNES AGAIN.

INQUIRIES have been made concerning the patent of Alfred Clark for a dental anodyne, the composition of which, copied from his patent, was given in an editorial in the February number of the DENTAL COSMOS. These inquiries relate to the fact that the formula patented fails to specify either the character or the quantity of the solvent employed, all the ingredients mentioned being solids except one grain of essence of peppermint and one-half grain of carbolic acid. We have only to reply to these inquiries that the composition described was copied literally from the patent, the inventor, either through accident or design, having omitted any mention of the vehicle employed.

Under date of January 27, 1891, James W. Hartigan, of Morgantown, W. Va., was granted a patent for "a new and useful composition of matter to be used for the extraction of teeth without pain, of which the following is the specification":

> "My composition consists of the following ingredients, combined in the proportions stated, viz: alcohol, ninety-five per cent., three and one-half fluid drams; fluid extract of hydrastis canadensis, one fluid dram; fluid

extract of geranium maculatum, one and one-half fluid drams; salicylic acid, thirty grains; oil of cloves, one fluid dram; carbolic acid, twenty drops; hydrochloride of cocaine, forty-five grains; Squibb's sulphuric ether, one fluid dram. These ingredients are to be thoroughly agitated until a perfect solution is obtained."

This composition is intended to be employed by application to the gums to produce superficial anesthesia in the parts, and then from three to five minims to be injected into the substance of the gum on either side of the tooth.

Dr. H. H. Buck, of Brockport, N. Y., calls attention by advertisement to the fact that he has discovered an obtundent that "will positively remove the sensitiveness in teeth prior to having them filled." He claims that the ingredients used in the preparation are known only to himself, but asserts that "it is impossible for it to injure the teeth."

We give to these various inventors the benefit of a gratuitous advertisement in the reading pages of the DENTAL COSMOS, in order to keep our readers posted, as far as possible, concerning these several "safe, sure, and reliable" dental anodynes.

It will be noticed that in each of the preparations whose formulæ we have given, cocaine is one of the ingredients, the amount varying from five grains to two hundred grains. In this connection we call attention to the report in the Periscope of the current issue of the occurrence of death in a dentist's chair from the injection of about one grain of cocaine into the gum, for the purpose of producing anesthesia previous to extraction.

THE NEGRO'S ANTHROPOLOGICAL POSITION.

PROFESSOR J. L. WORTMAN discusses this subject in the *Analostan Magazine* from the particular stand-point of the anthropologist. He claims that the distinctions that are to be found between the Negro and the white man are of such a nature that few naturalists would hesitate, did they find them elsewhere than in the human kind, to classify them as separate and distinct species definable by well-marked and ever-present characteristics. After noticing the differences between the Negro and the white in detail, both as regards internal and external anatomy, he thus writes of the relation of the facial skeleton:

> The upper jaw is decidedly prognathous or, in other words, projects forward. The index of this character is found in the so-called facial angle of anthropologists, which consists of the angle formed by two lines, one drawn from the base of the incisor teeth to the most prominent point of the forehead, the other from the base of the incisor teeth along the base of the skull.

As the face is short and the frontal region well developed, the angle will approach a right angle, or 90° ; but in proportion as the face is drawn out and projects forward and the frontal region is little developed, the angle will be small. In the skull of the dog, for example, this angle is very acute ; in the monkey it is less so, and in the white man it approaches nearest to a right angle. For this reason we have the term orthognathous, or having straight jaws, in contradistinction to prognathous, or having protruding jaws. The skull of the white is, therefore, spoken of as orthognathous. Now in the Negro skull this angle measures from 65° to 70°, although it may drop as low as 60°, while in the average European it runs from 80° to 85°. In the adult chimpanzee it is 35°, and in the orang it is 30°. We will readily see, therefore, that as the Negro departs from the white man he approaches the ape.

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We come next to consider the teeth, and here again we find the same unmistakable evidence of a lowly condition in the Negro skull. In the white man the shortening of the face and consequent reduction of the facial skeleton has materially affected the dental arch. To such an extent is this true that it is almost the exception to find, nowadays, a perfectly well-formed arch with a normal set of teeth. The teeth that have been most affected by this change are the last molars, which have been truly said to be in an advanced stage of disappearance, and at no very distant period the European skull will be further characterized by the absence of the third molar or *dens sapiens*. Indeed, from my own investigations I have the record of many persons in whom this tooth has never appeared at all. This I find to be characteristic of whole families, and it proceeds from generation to generation, becoming more and more fixed.

In cases where it is developed it is always smaller than the other molars, the roots are connate or grown together, and it is so lacking in vitality as to be subject to rapid decay, frequently necessitating early removal. The crown is ill-defined, hardly ever bearing more than two cusps, and frequently only one, whereas the other molars in advance of it normally possess four. Another tooth which has been affected by this change, although not to the same extent, is the lateral incisor of the upper jaw. In many persons this tooth is very small and peg-like, and in others again it may be altogether wanting. Finally, the frequent deformity of the dental arch and the malposition of the teeth in the European skull still further attest the fact that this part of the facial apparatus has been profoundly affected by some cause, and this, in my judgment, is to be attributed to the shortening of the facial skeleton.

Turning next to the anthropoid ape, as representing the other extreme in the series, we note that the tooth line is much longer, the sides of the dental arch are nearly straight, and the individual teeth are relatively larger and stronger than in the human jaw. The last molar is as large or a little larger than the others, its roots are always well developed, the crown bears four distinct cusps and it is never, to my knowledge, absent. There are other dental characteristics, such as the enlarged cuspids, the existence of a space or diastema between the cuspids and the incisors of the upper jaw, together with others of less importance, which distinguish the dentition of the ape from that of man, but which need not be considered here.

What, we may now inquire, is the position of the Negro with reference to these two extremes? In the first place, the simian character of the straight molar-tooth line is often to be noticed. The last molar, which attains its most distinctively simian proportions in the Australian and Malay, is in the

Negro skull almost always well developed, with its full complement of cusps and roots, and in a series of forty African skulls which I have examined was always present. Its size, although slightly inferior to the other two molars, is yet such as to indicate a perfectly healthy and normal organ without any evidence of degenerative tendencies.

PALMER'S DENTAL NOTATION.

In justice to the well-founded claim of Dr. Corydon Palmer to have originated a system of dental notation which in its fundamental features has been brought prominently before the profession as of trans-Atlantic origin, we in this number publish his paper on the subject. The printed record to which he refers seems to make clear his title to the authorship of the system, which it therefore appears should fairly bear his name.

In his note-book which practically exemplifies his system he adds to the symbols well-sketched representations of the individual teeth, on which he marks the forms of the fillings, so that when desirable the patient, to whom the symbols would be unintelligible, may get a clear idea of the operations performed. Few dentists could draw tooth-forms with the accuracy shown in the sketches, as is in fact evidenced by his original charts, one illustration of which (see his Fig. 4) was cut from a photographic reduction on the wood of the engraver; and therefore such sketches are not incorporated in his system. Mention is, however, here made of them as an additional indication of the ability and accuracy of the author.

DR. BLACK'S SERIAL.

Owing to other pressing engagements, Dr. Black was unable to furnish in time for this number of the Dental Cosmos the continuation of his paper on "The Management of Enamel Margins." We hope to present it in our next issue.

DR. R. R. ANDREWS'S PAPER.

Through a misapprehension of what was intended by Dr. Andrews, the paper read by him on "The Development of Enamel" at the Union Dental meeting in Boston was published in full in the February number of the Dental Cosmos, instead of by abstract, as was desired by the author, who preferred that it should appear in full only in connection with the illustrations, for which arrangements had already been made with another journal.

BIBLIOGRAPHICAL.

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY for 1890. B. H. Catching, D.D.S., Editor and Publisher, Atlanta, Ga. Octavo, pp. 250. Price, cloth, $2.50.

The announced purpose of the editor was to provide a hand-book of practical excerpts from the journalistic dental literature of the year. That purpose has been fairly well accomplished in the volume before us. The related topics have been grouped for more ready reference, and the book we have no doubt will prove useful in furnishing information sought more readily than it could be obtained by a search through the various journals. The student should find this compendium valuable as containing many descriptions of modern appliances and methods of practice. The book is well printed, on good paper, and as the initial volume in an undertaking involving manifestly many difficulties, is creditable to the compiler.

PAMPHLETS RECEIVED.

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American Dentistry. Address delivered before the American Academy of Dental Science, Boston, Mass., November 12, 1890. By W. W. H. Thackston, M.D., D.D.S., of Farmville, Va. Boston : Rockwell & Churchill, 1891.

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Transactions of the Indiana State Dental Association, Thirty-second Annual Meeting, held at Lake Maxinkuckee, Tuesday, June 24, 1890, continuing three days. Published for the Association. Indianapolis: Wm. B. Burford, printer, 1890.

OBITUARY.

DR. JULIEN J. VANDERFORD.

DIED, in Stuttgart, Germany, January 5, 1891, of rheumatic fever, JULIEN JAMES VANDERFORD, D.D.S., in the forty-sixth year of his age.

Dr. Vanderford was born in Baltimore, October 25, 1845. He went early in life to Elkton, Md., where he studied dentistry with Dr. B. J. Bing, now of Paris, France. Subsequently he graduated at the Pennsylvania College of Dental Surgery, class of 1866, at which institution a few years later he was demonstrator of operative dentistry. After graduation he practiced his profession at Middletown, Del., Baltimore, Delaware City, and Philadelphia. From the latter city, fourteen years ago, he went to Frankfort-on-the-Main, Germany, and about two years later to Stuttgart, where he soon had a large and lucrative practice. He was a skillful operator, and had prosecuted the study of medicine after his graduation in dentistry.

Dr. Vanderford leaves a widow, who was a Miss Smethurst, of Philadelphia, and one daughter.

DR. BENN C. JEWETT.

DIED, at Pleasant Valley, N. Y., at the home of his parents, Saturday, January 24, 1891, of malarial fever, BENN C. JEWETT, D.D.S., of Philadelphia, Pa., in the twenty-fifth year of his age.

Dr. Jewett was born in Pleasant Valley in 1866; educated in the Waterville Academy; studied dentistry with Dr. C. H. Bennett, of

Waterville, N. Y. ; graduated at the Philadelphia Dental College in 1889, and at the time of his death was assistant demonstrator of operative dentistry in that college.

He was a young man of great promise in his chosen profession, and by his Christian character and personal attractions had made himself respected and beloved by all who knew him.

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DENTAL LEGISLATION.

DENTAL LAW OF THE NORTHWEST TERRITORIES.*

An Ordinance to regulate the practice of Dentistry in the Northwest Territories.

The Lieutenant-Governor, by and with the advice and consent of the Legislative Assembly, enacts as follows :

1. That no person shall practice the profession of dentistry or dental surgery in the Northwest Territories without having first received a certificate as hereinafter provided, entitling him to practice dentistry or dental surgery.

2. That such certificate shall be issued by the Clerk of the Legislative Assembly, upon production to him of a diploma of graduation in dental surgery from the faculty of any Canadian dental college, or the faculty of any Canadian university having a special dental department, or from any such institution duly authorized by the laws of Great Britain, or any of her dependencies ; or a license to practice dental surgery issued by any of the Provinces of the Dominion of Canada, or a diploma or license from a foreign dental institution, which required at the time of issue of such diploma or license attendance at a regular course of lectures, and an apprenticeship of not less than two and one-half years ; or who has been in regular practice in the Northwest Territories as a dentist or dental surgeon for a period of one month immediately preceding the passing of this ordinance, and it shall be the duty of the persons claiming to be entitled to the certificate required by this section, to produce to the said clerk evidence, satisfactory to him, of his being entitled thereto.

Provided always, that nothing herein contained shall be construed to require physicians, surgeons, or others to take out such certificate for the purpose of qualifying them to extract teeth.

3. That before any such certificate is granted the applicant shall pay to the general revenue fund of the Territories the sum of twenty-five dollars, unless he is a person who, at present and for one month immediately preceding the passing hereof, has been in the actual practice of dentistry and dental surgery in the Northwest Territories, and in such case he shall pay into said fund the sum of five dollars.

4. After the period of six months from the passing of this ordinance, any person, not holding a valid certificate issued by the said clerk as aforesaid,

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* Inquiries having been made concerning the character of the legislation regulating the practice of dentistry in the Northwest Territories (Dominion of Canada), we publish the ordinance herewith for the information of our readers. —EDITOR DENTAL COSMOS.

who practices dentistry or dental surgery, except extracting teeth, shall be guilty of an infraction of this ordinance ; and, upon conviction by any justice of the peace within the Territories in a summary manner, pay a fine of not less than twenty dollars nor more than one hundred dollars, in the discretion of said justice, and costs.

5. That no person who has not received the certificate required by this ordinance shall recover in any court of law any fees or money for any materials provided by him in the practice of dentistry or dental surgery, except for extracting teeth.

PERISCOPE.

The Pathological Anatomy of Tic Douloureux.—This was the subject of a paper by Dr. C. L. Dana. He said that inveterate trigeminal neuralgias were usually caused by local disease, such as bony tumors, aneurisms, or syphilitic exudations ; but the ordinary cases of tic douloureux, occurring after middle life, affecting chiefly the second branch of the trigeminus, were not due to such causes. Little was known of its anatomy, it being generally believed that there was no especial change in the nerve or its centers, and that the disease was a neurosis. Anstie was of the opinion that tic and other chronic neuralgias were due to atrophic changes in the root and sensory ganglia. Dr. De Schweinitz had recently reported one case in which he had found evidence of some degenerative inflammation in the nerve. Recently the Gasserian ganglion, removed in a case of tic, was found to show degenerative atrophy. The author was confident that neuritis and degenerative changes in the nerve were not the usual and ordinary conditions in tic douloureux, for in almost all of the cases, no matter how old, no permanent anesthesia occurred. On the other hand, in cases of progressive trigeminal anesthesia, due to degenerative neuritis, there had been but little pain. The question arose, therefore, whether there was any tangible cause of the condition. The author's proposition was that many cases were due to an obliterating arteritis of the nutrient vessels of the nerve. His reasons for these views were :

1. That the disease occurred only at a time of life when degenerative changes in the arteries began.

2. That it affected chiefly and primarily one of the terminal branches of the internal maxillary. If it extended or recurred, it involved the inferior dental. It rarely affected seriously the supraorbital nerve, which was supplied by a branch of the internal carotid. Hence the disease followed a certain fixed vascular distribution.

3. That he had examined four superior maxillary nerves, removed in typical cases of tic douloureux ; in none were there any noteworthy changes in the nerves. In three of them striking evidence of arterial disease was found. In the fourth case no blood-vessel was present in the specimen.

4. The view that an obliterating arteritis was a factor in this disease was strengthened by therapeutical experience. Nitro-glycerin would sometimes relieve pain instantly and prevent a return for a long period of time. Aconite, which was so useful in this disease, also lowered

blood-tension; while potassium iodide, which sometimes favorably modified arterial disease, was occasionally useful in tic.

5. That there was unquestionable evidence that removal of the peripheral nerves sometimes cured tic entirely, and hence the disease was peripheral, and due to some local peripheral irritation.

6. Certain authors had recently stated that by a new method of injection they had been able to discover a closer and more extensive relationship between the nerve-trunks and blood-vessels than had hitherto been known, and they suggested in their conclusions that disturbances in blood-supply might be a serious factor in causing neuralgia.

The author then gave the histories of a number of cases which he considered typically corroborative of his theory. He adduced positive facts that the trigeminus and its roots, and even nuclei and deep roots, were not diseased even in old and typical cases. In all cases where the vessels were examined, striking disease was found to be present. Circumstantial evidence was found by therapeutic experiment and the general etiology and anatomical distribution of the vessels and of the pains. His argument, he said, was defective, in that he had not examined the infra-orbital arteries of healthy persons of from forty to sixty years of age. But this was not much of a defect, for the reason that with obliterating arteritis there must be some specific vulnerability of the nerve-centers. At present it seemed to the author that it would be pretty safe for him to assert that most of the typical cases of tic douloureux occurring after middle life were due to an obliterating arteritis of the infra-orbital or inferior dental artery, terminal branches of the external carotid, plus some peculiar vulnerability of the central nervous system.

Discussion.—In reply to a question by Dr. Ferguson, Dr. Dana said that he had not been aware of the existence of any renal symptoms or of any changes in the temporal or renal arteries in any of the cases he had mentioned. He thought that in such typical cases of chronic neuralgias—as, for instance, sciatica—evidences of arterial changes would be found, if sought for.

The president thought the theory that Dr. Dana had advanced well worthy of consideration. No doubt, nervous phenomena were met with in which great pain was present, but which led to no changes in the nerve-bundles.

Dr. Dana said that he had been struck with the effect produced by the exhibition of nitro-glycerin in these cases. This drug was not an anodyne, but its action was essentially upon the circulation.—*Reports New York Neurological Society, in Journal of Nervous and Mental Disease.*

MICROSCOPICAL LABORATORY NOTES. *Dissecting Knives.*—The delicate blades of small dissecting knives are liable to become injured, if the instruments are not carefully cared for when not in use. I find that a small piece of thick blotting-paper can be slipped over the blade like a sheath to a sword. If the blade is dipped in vaseline before putting it away, there is no danger from rust.

Gold Size.—The works on microscopy give complicated and tedious methods for making gold size from linseed oil (*oleum lini*). It is entirely unnecessary to follow them, as the article can be purchased from varnish-dealers at fifty cents a pint. It is known as "gold size varnish." It costs more than this to make it, by boiling linseed oil with litharge, or passing oxygen through the oil, as one ingenious writer suggests. Gold size can be used as a cement as it is, but I prefer to add about one-fourth the bulk of benzol to thin it, so that it flows more smoothly from the brush.

A Valuable Lamp.—I have tried numerous kinds of lamps to find the one most suitable for general use. The most serviceable one seems to be a Pinnefore burner and chimney on a large bracket bowl that is supplied with a handle and an opening for filling the lamp. When arranged with a large white shade the outfit costs but $1.15 and is much more useful than the expensive student's lamps, or special ones made for microscopists. If the light is too low for some work, it can be easily raised by placing the lamp on a cigar-box or blocks of wood.

Brunswick Black.—Of late this cement has been made by replacing the oil of turpentine with benzol, which makes a smoother cement, and causes it to dry more quickly. It also makes it much more expensive. I find that the rectified oil of turpentine answers nearly the same purpose as the benzol and is not so expensive. It is also necessary to use the true Trinidad asphaltum, and not the ordinary kind that is made into street pavements. I make the cement by dissolving Trinidad asphaltum in rectified oil of turpentine until of the proper consistency, and then straining through muslin. To this add nut oil in the proportion of five minims to the fluidounce of cement.

Absolute Alcohol.—It is quite expensive to buy absolute alcohol for general use. I heat four ounces of sulphate of copper until it is thoroughly dried, and then add it to one pint of commercial alcohol, and shake the mixture thoroughly and let stand for a few hours. The salt takes up the water and turns blue. Alcohol treated in this manner answers most purposes where absolute alcohol is wanted. The same salt can be dried and used over again for another quantity of alcohol.

Labeling Slides.—Not every one stops to think how much more convenient it is to have the principal label on the left-hand end of a slide. We naturally pick up a slide with our right hand and grasp it by the right-hand end. This covers up the label on that end, so I make it a practice to place the label on the left-hand end; or, if two labels are to be used, I put the main one on this end and the less important one on the right.

Acacia Cement.—I find that a useful cement for finishing off balsam mounts is made by dissolving acacia in water and precipitating it with alcohol, and thoroughly washing the precipitate with alcohol until only insoluble matter remains. Make a saturated aqueous solution of this. To one fluidounce of the solution add four drachms of the C. P. hydrated aluminum, two fluidrachms of glycerin, and the same quantity of water, and then strain through muslin. This cement dries quickly, and can be followed with a coating of any other cement desirable.

A Clean Cloth.—It is customary to have an old silk handkerchief convenient for the purpose of wiping off objectives, cover-glasses, slides, etc. It is also quite common to see this cloth left out in the dust and dirt. I keep the piece of old silk in a tight box, so that it is not gathering dust when not in use. When it becomes soiled it should be washed.

Balsam Bottles.—The mouth of a balsam bottle is usually smeared with balsam, so that the pipette soon becomes dirty and sticky. In order to avoid this I bend a piece of wire in the form of a quadrilateral and about the size of the greatest dimensions of the inside of the bottle. When this is placed in position the upper end serves as a support to scrape off any superfluous balsam from the pipette. If carefully used, the lip of the bottle can be kept perfectly clean.—*H. M. Whelpley, Ph.G., F.R.M.S., in The Microscope.*

HOW TO CLEAN OLD SLIDES AND UTILIZE SPOILED MOUNTS.—For two years past I have permitted soiled slides and spoiled mounts to accumulate in a box set aside for that purpose. The process I have recently followed in reclaiming them has been successful.

I first placed the unsightly rubbish in a dish of clean water, where it remained until all of the labels were readily removed; with an old knife I next scraped off the cells and all cement that could be easily removed in this manner. All slides where glycerin or other substance soluble in water had been used as a mounting medium were again washed, and then the entire pile spread out and dried. I separated those that were clean and placed the rest in alcohol for several days. This solvent cleaned another portion of the slides, so that all they required to render them as good as new was a washing in water. The remaining dirty ones were treated to a bath of oil of turpentine, where they rested for a few days. From this they were washed with alcohol and then finished in water. The few refractory ones that held out during all this time were made as clean as ever with benzol.

Although considerable time elapsed before the last slide was cleaned, it required but a few minutes of actual labor in the entire process. The time consumed is in letting them stand in the different liquids. Nor is the process expensive, as the oil of turpentine did most of the work. Hereafter, I shall divide my old slides into three classes and clean them separately, so that less alcohol will be required. The first box will contain slides that can be washed clean with water, the second lot will be those that alcohol will clean, and the third ones requiring benzol.

Cover-glasses are so cheap that I do not save them, unless they are easily cleansed with water. I find it very difficult to properly clean thin cover-glasses that have cement on them.—*H. M. Whelpley, F.R.M.S., in American Microscopical Journal.*

DEVELOPMENT OF THE DENTINE.—At a meeting of the Scottish Microscopical Society, held in Edinburgh on Friday, the 19th of December, Professor Rutherford, F.R.S., in the chair, Dr. W. G. Aitchison Robertson read a paper on the Growth of Dentine and the Relation of Nerves to Odontoblasts, being the results of a research carried out in the physiological laboratory of the University. He studied the development of dentine in the teeth of rabbits and kittens; in the former taking advantage of the aid given by feeding the animal for a time on food containing madder, which stains the dentine matrix produced while the madder is being taken just as it does the matrix of bone. He finds that elongation of the dentine results from proliferation of connective-tissue cells in a formative ring at the base of the tooth-follicle. The diameter of this ring enlarges while the tooth is growing in breadth as well as in length, but narrows while the fang is growing into the shape of an inverted cone. The thickening of the dentine results from new layers of matrix added from within under the influence of odontoblasts, and not from interstitial growth, which produces nothing more than a slight increase in matrix between the dentinal tubules in the crown of the tooth. The manner in which the pulp-cavity comes to be occluded and the dentine deprived of sensibility in the crowns of the incisor teeth of the rabbit was explained. The odontoblasts in the tooth of an ox are bipolar, one process being a dentinal fiber, and the other continuous with the nerves of the pulp. He thus regards the odontoblasts and dentinal fibers as becoming in course of development the terminal organs of the nerves of the tooth.—*The Lancet.*

DEATH IN A DENTIST'S CHAIR FROM COCAINE INJECTIONS.—The *Journal für Zahnheilkunde*, September 25, 1890, reports a case of death in a dentist's chair from injections of cocaine into the gum, given for the purpose of inducing anesthesia for the extraction of roots of teeth. The patient was a woman, twenty-nine years old, apparently perfectly healthy but very nervous. The extraction was painless, and nothing abnormal was noted. The operator withdrew from the patient's chair to get some water for the patient to rinse her mouth with, and on his return found her motionless. Physicians were summoned and artificial respiration was practiced, but without success. The autopsy disclosed the fact that three injections had been given, which served for the extraction of three roots. The quantity of cocaine in each injection was [illegible] centigrams, or one-third of a grain. The *Journal*, after commenting upon the dangers of cocaine, refers to nine cases of fatal poisoning reported by Dufournier, in the *Archives générales de Médecine.* One of these cases, however, is doubtful, as the patient took a mixture of chloral and cocaine. None of them happened to dentists, and the *Journal* thinks the case it reports the only fatal one occurring in the practice of a dentist. This may be true, but serious and well-nigh fatal cases undoubtedly have occurred. The *British Medical Journal*, Feb. 9, 1889, p. 311, refers to one in which one grain and a third of cocaine was used.

To show how uncertain the action of cocaine may be, a case may be mentioned in which one-seventh of a grain injected into the eyelid produced very serious poisoning. The case is reported by the *British Medical Journal*, in the article already referred to. It would appear not to be safe to inject a larger quantity than one-half or three-fourths of a grain, especially into very vascular tissues, from which absorption is likely to be rapid and the consequent danger of a maximum effect upon the heart is greatest.—*Medical and Surgical Reporter.*

RISKS OF COCAINE INJECTIONS.—The *Medical Press*, November 5, 1890, says that two warning cases are reported from France. In one of them, which occurred at Lille, the patient died, and the dentist who gave the injection was acquitted of neglect, but condemned for practicing medicine without qualification, the judgment indorsing the view that cocaine is an anesthetic which requires to be used with prudence, and cannot legally be administered by other than a qualified medical man. In the other case, which occurred at Paris, the patient was with great difficulty brought round by hypodermic injections of ether. The cocaine injection was also made in this case by a dentist. —*Medical and Surgical Reporter.*

COCAINE AS A LOCAL ANESTHETIC.—On the 2d of December, 1890, M. Hallopeau reported to the Académie de Médecine a case of chronic cocainism induced by a single injection into the gum of eight centigrams of hydrochlorate of cocaine. From a study of this case, he believes himself authorized to deduce the following conclusions :

A single injection of cocaine, even in a small dose, may not only produce immediate toxic symptoms of a grave character, but may give rise to symptoms persisting for several months. These distant symptoms are analogous to those perceived sometimes immediately after the injection, viz : obstinate headache, insomnia, numbness of the extremities, attacks of faintness, dizziness, prostration, loquacity, and a state of great agitation. These accidents are chiefly observed in very excitable subjects.

In the current number of *La Médecine Moderne*, M. Reclus, who employs cocaine largely, endeavors to controvert these statements of M. Hallopeau, and asserts that, properly managed, this valuable anesthetic is innocuous. The rules to be followed in the management of this drug are, according to M. Reclus, as follows :

1. The quantity of cocaine injected should never exceed 12 centigrams, 2, 4, 6, or exceptionally 8 centigrams sufficing for most minor operations.
2. Employ a *weak solution* (2 per cent.).
3. Avoid the introduction of the drug into the interior [illegible] blood-vessel. The best way to avoid the evil consequences of such a *contretemps* is to push the needle into the tissue slowly, and while so doing to press on the piston-rod at the same rate. In this manner, even [illegible] a vessel be pierced, only a small proportion of the solution can mingle with the blood contained in the wounded vessel.—*Paris Correspondence of Journal of American Medical Association*.

MOUTH-WASH FOR STOMATITIS.—David uses the following mixture as a tonic and antiseptic mouth-wash :

℞—Thymol, 7 grains ;
Borax, 15 "
Water, 1½ ounces.

A few drops of this are to be placed in a wineglassful of warm water, and the mouth rinsed with it. In cases in which the breath is fœtid, owing to deposits about the tonsils and gums, the following wash is said to be serviceable :

℞—Borate of sodium, 15 grains ;
Alcohol, ½ drachm ;
Water, 1 pint ;
Thymol, 7 grains.

—*Medical News.*

A SUBMAXILLARY COMPOSITE CARTILAGINOUS TUMOR.—Dr. Weir showed a tumor of the size of a Tangerine orange which he had removed from below the inferior maxilla after it existed there eleven years. Its growth had progressed slowly and without much pain. It could be felt in the mouth close to the bicuspid teeth, and through an incision there two salivary calculi as large as peas were removed. After a delay of several months without any subsidence of the growth, he operated with the idea that the tumor was the result of an obstructed salivary gland. He enucleated it. It was found attached to the edge of the submaxillary gland, and was a composite cartilaginous growth similar to those commonly met with in the parotid region.—*Proceedings New York Surgical Society*, *in New York Medical Journal.*

PYOKTANIN.—Professor Stilling has given, in three recent numbers of *Merck's Bulletin*, a valuable report upon pyoktanin. He summarizes its qualities in the following terms: 1. Pyoktanin is an antiseptic surpassing all remedies of this kind heretofore known in regard to both development-arresting and germ-destroying effect. The two strongest antiseptics employed in medical practice are sublimate and iodoform. The bacteriological researches have shown blue pyoktanin to be about three times as strongly antiseptic toward anthrax bacilli as sublimate is, and to be quite as efficacious as sublimate toward the staphylococcus aureus; while the inefficacy of iodoform toward pus cocci is a generally acknowledged fact. 2. Pyoktanin is an absolutely non-toxic substance. Herein it possesses a most desirable advantage over all the other antiseptic remedies, whose toxic effects are known to hold, generally, a pretty direct ratio to their anti-bacterial action. 3. In consequence of this non-toxicity of pyoktanin it is a matter of indifference in very many cases whether somewhat weaker or stronger solutions, or even the pure drug, be employed. (This principle is good pre-eminently in the treatment of wounds and ulcers; but of course it cannot apply to ophthalmology.) 4. Pyoktanin does not coagulate albumen—a negative quality of high value physiologically, which pertains to not a single one of the antiseptics heretofore known. 5. Pyoktanin possesses an extremely high degree of diffusibility; it permeates the interior of the eye like atropine, and acts similarly in other tissues. As far as surgery is concerned, Professor Stilling believes that his researches have demonstrated that suppuration can be cut short by bringing pyoktanin into intimate contact with the suppurating tissues. After giving details of his experience of this substance in many branches of ophthalmological work, he concludes by remarking that even here, though somewhat less so than for general medicine and surgery, the entire matter is still *in statu nascendi.*—*The Lancet.*

DENTISTRY IN CHINA.—The report of the physician in charge of the Ningpo Missionary Hospital for the past year contains some interesting observations on tooth-drawing in China. Dr. Daly remarks that Chinese teeth are much more easily extracted than those of Europeans. The native dentists are said to possess a wonderful powder, which is rubbed on the gum over the affected tooth; after an interval of about five minutes the patient is told to sneeze, whereupon the tooth falls out. Dr. Daly has offered a reward of one hundred dollars to anyone performing the operation in this way in his presence, on condition that he is allowed to choose the tooth and examine the mouth before and afterward. So far no one will consent to perform the operation on these conditions.—*British and Colonial Druggist.*

HINTS AND QUERIES.

To the Editor of the Dental Cosmos :

Sir,—I have just read your editorial in the February number of the Dental Cosmos on "Secret and Patented Local Anesthetics," and write to thank you for it. It comes none too early. The local anesthesia idea, a taking one, has already run into a widespread and mischievous craze. It is mischievous mainly, I think, because it is demoralizing, and it is demoralizing because in its practice success of any kind or degree depends largely on deception.

As pain cannot be measured or recorded, one person can never know what another person suffers, and so the margin for honest error, as well as for willful deception, is broad and easy. Whether a so-called local anesthetic is applied in good or bad faith, if the pain of the operation is less than the patient expected,—which it is, anyhow, in most cases of tooth-extraction,—the drug is given credit for the difference, at least, and so by turns both the patient and the operator may be deceived. In such cases the mind of the dentist can be most effectually disabused by putting him at the other end of the forceps. If any man believes he has a good local anesthetic, let him have it tried on himself.

In the concluding paragraph of your editorial it is pertinently suggested that the indorsement of such secret or patented preparations by dental practitioners is a question in ethics which it would do no harm to discuss. It might also with propriety be suggested that the practicability of local anesthesia, except on membranous surfaces, is a fundamental question of fact not too far gone for controversy.

For myself I am convinced that, except the decided impression made on membranous surfaces by cocaine and some other drugs, notably aconite, local anesthesia is physiologically almost impossible. I believe this is so by reason of the vital and physical qualities of animal tissues. They are capable of absorbing substances in the physiological sense, but it is hardly possible, I believe, to saturate them with drugs by direct application, as if they were dry sponge. As to that, they are already saturated with their own proper fluids under considerable pressure, and so, aside from their vital and organic qualities, the conditions are not favorable for such local diffusion of foreign substances as would be required to bring them readily in contact with all the nerve-fibers of a part. A medicine injected under the skin makes for itself a cavity in the tissues, in which cavity it remains, I believe, until it is carried away by the capillaries that lead to the venous system. If it is diffused into the adjacent tissues at all, as it would be in dry sponge, it must be to a very limited extent.—J. W. Holt, D.D.S., Goldsboro, N. C.

Painless Pulp-Capping.—During several years I have been using medicated chloro-percha with great satisfaction for capping exposed pulps. In half an ounce of chloroform dissolve small pieces of gutta-percha base-plate to about the consistency of thick cream, and to the solution add five drops of carbolic acid, ten drops spirits of camphor, and five drops oil of cloves. In a case of bare pulp exposure, or if it be nearly exposed, apply the rubber-dam, dry the cavity with softest spunk, dip a small instrument in the solution, and apply to the point of exposure, taking care to flow the fluid over the pulp without any pressure. So soon as the pellicle has dried, take a little disk of letter-paper, wet on one side with the solution, and gently lay that side over the pellicle. Add like disks until the thickness over the exposure is sufficient to resist slight pressure. The cavity may then be filled with cement or amalgam. When gold is to be used for the filling, I add a small metal cap perforated to let out the surplus solution and to avoid the slightest pressure on the pulp. The solution is a non-irritant, and in an emergency I use it for the relief of odontalgia from exposed pulp, first applying a little carbolic acid, and then flowing over the exposure a small quantity of the medicated chloro-percha. I should be glad to learn of its use with like success by other practitioners.—F. E. COOMES, San Diego, Cal.

PAIN AFTER EXTRACTION.—A careful and thorough examination of the alveoli should invariably follow the extraction of a single tooth or of many teeth, because the thin process is apt to be fractured in the operation, and the spiculæ should be at once removed. The sharp edges of the alveoli should be smoothed with a round engine-bur, and any loose points of gum-tissue be cut off with the Quinby scissors. After a few minutes' delay to allow cessation of the incidental hemorrhage, a little tampon of cotton wound on the thin, flattened, and curved end of a suitable instrument should be wet with phenated camphor, and the root-sockets as well as the lacerated gums be gently and thoroughly bathed with the antiseptic and detergent fluid. This will at once assuage the pain that usually follows extraction, and will furthermore aid in effecting a rapid healing of the wounded parts without the pain commonly consequent upon frequent failures to complete the surgical operation of which mere tooth-extraction is but a part. The old-time barber or blood-letter could expertly relieve the sufferer of a tooth, but the modern dentist should be able to also give relief from the pain.

It is a lamentable and likewise a professionally disgraceful fact that patients often suffer after extractions because they assume that since the dental cause has been removed there is nothing to be done but to patiently endure the pain, or seek the physician in hope of relief. The competent dentist will, however, surgically complete the operation and advise the patient to return for subsequent inspection in order to be sure that further professional interference is not needed, or to give it if necessary. In the event of the continuance or the recurrence of pain, no time is to be lost by the patient in requiring the relief which the dentist will almost certainly be able to afford. It will be a long step toward real professional recognition when dentists and their patients learn that the pain as well as the tooth is removable, and often the former without the latter.—H.

CAPPING EXPOSED PULPS.—For the last year I have been experimenting some in capping freshly exposed pulps, previous to which my success was so limited that my usual practice was to devitalize and remove them. But now they seldom give any trouble. Whether they will in the future is more than I can say. But this is certain: that I have never been able to keep them quiet so long before, only in exceptional cases. Whether it will prove as successful in the future as in the past is more than I know, but I think it will be well worth a thorough trial by the profession. Care must be taken to wash out the cavity with a solution of boracic acid, so as to be sure that all the fresh blood is removed, and while it is still moist lay a small scale of dry boracic acid over the exposed portion, and then fill; it is stiff, and prevents undue pressure on the pulp, and takes the place of metal or court-plaster that some use for that purpose.

What drew my attention to it first was from the treatment of a gunshot wound in my little boy's arm. The ball passed through the fleshy part of the arm about midway between the shoulder and elbow. An injection of a solution of boracic acid was forced through the opening on the opposite side of the arm, a tuft of antiseptic cotton was placed over both openings, and a bandage bound tightly over them running to the elbow. The bandage was not removed for three weeks, when it was entirely healed, no suppuration having taken place, which suggested the idea that possibly the same results might be obtained in recent exposures of the pulp. Subsequent experiments seem to be very promising, and I would recommend that the profession give it a trial.—W. H. JACKSON, D.D.S., Ann Arbor, Mich.

FILLING TEETH WITH COAL.—In a paper on this subject read before the Dental Section of the International Medical Congress at Berlin, I alluded to the well-known fact that coal powder employed as a dentifrice would collect under the free margins of the gums, which thereby became discolored, but would not be irritated by the long-continued presence of the particles of carbon imbedded therein. It was therefore inferred that coal is peculiarly tolerable to tissues, and being besides in some sort an insoluble antiseptic, its suitability for tooth-canal filling was apparent. Subsequent experience confirmed the deduction.

I have used coal in various forms for filling root-canals, but prefer a manufactured article in the form of felted coal, and one of my methods is as follows: The tooth having been previously subjected to antiseptic treatment is inclosed in the rubber-dam, the root-canals made dry, and then filled with alcohol from a drop-tube or syringe. By this means all air is excluded and the introduction of the coal filling facilitated. A suitable small piece of coal is then taken with the foil-pliers, heated over the annealing lamp flame, and pushed to place in the canal with proper pointed pluggers. These should not be too fine or sharp, but have flat-ended points as large as the canal will admit. The preliminary alcohol injection may be omitted, and the coal used dry and heated. It may be forced into the narrowest canals, and is especially suited to deciduous teeth, as it offers no obstruction to the resorption of the roots. The black color of coal is objectionable when thin enamel-walls allow it to show through, but in such cases the discoloration may be prevented by cement protection, or the excess of coal may be washed out with alcohol followed by the warm-air blast. The pulp-chamber and crown-cavity are then filled with gold or any suitable material. In large cavities pieces of coal may be imbedded in the cement or amalgam filling. The permanence, non-irritability, and antiseptic properties of coal under all possible conditions of dental uses render the material valuable for many purposes in dental surgery. As a vehicle for every class of medicaments applicable to exposed pulps, suppurating surfaces, or accessible alveolar abscesses, coal in the mat or felt form is invaluable, and it affords me great gratification to bring it to the notice of the profession.—DR. ELOF FORBERG, Stockholm, Sweden.

A STRAIGHT TIP.—Doing right is more important than knowing how, but it is often well to know how. A lady came into my office some time ago to ask my advice regarding her daughter. The latter had some years since fractured her left superior central in a line running from the mesial to the distal surfaces, from above downward, losing about half the tooth. It had given her no trouble, except the disfigurement, the tooth being alive and in good condition. The mother had consulted a number of dentists, who all advocated restoration by filling, or cutting off the remainder of the crown and substituting porcelain. These methods were objectionable to her, and it remained for me to suggest a porcelain tip.

The edge of the fracture was ground and filed perfectly smooth, and a plain tooth of the proper color and size was ground until it would replace the lost fragment. Correspondence with The S. S. White Dental Manufacturing Company followed, and the result was they made for the case a porcelain tip from the model and sample sent, with two holes drilled into it. It was but small work to secure platinum pins from an old tooth and cement them into these holes. These corresponded to similar ones in the tooth proper. A little pasty oxyphosphate cement and pressure was all that was necessary to secure the tip in place.

It has been in place over six months now, and is giving good satisfaction. The line of union is hardly discernible. The operation was simple, cheap, and satisfactory.—F. L. Dolbeare, Oshkosh, Wis.

Aristol in Dentistry.—J. v. Kejzlar in Jicin recommends (in the *Oestr.-Ung. Viertelj. f. Zahnhlkde*) aristol as a first-class remedy for the dentist. The author has used it in nearly all cases with good results in place of iodoform, the bad effects of which on senses of smell and taste are removed by the use of aristol. He writes:

"I tried aristol in all cases where the ordinary antiseptics were wont to be used, also in gangrenous pulps, the antisepticizing of root-canals, disinfection of cavities before the introduction of fillings, etc. In gangrenous pulps I applied the aristol with a small brush in solid form; for the disinfection of carious cavities and root-canals I used a 10 per cent. solution of aristol in (sulphur-) ether. Through the quick evaporation of the ether the aristol composes an even cover and quickly dries out the cavity. In gatherings I used sticks made of cacao butter 10 parts, aristol 1 part, whereby granulation and healing up are promoted."—N. G.

Broken Drill or Post Removal.—The difficulty of removing from a tooth-root the broken-off head of a drill, or of a tooth-crown pivot or post, has been experienced by every dentist in the course of any considerable practice. In some such cases I have had gratifying success through the use of an engine trephine like that of the Walker-Younger, No. 1 size. In operation the broken object enters the tube of the trephine, the narrow teeth of which cut a groove around the object, which is thus loosened and may be readily removed. Special trephines of three or four closely graded sizes and tubes of about half an inch deep would be requisite for ready and efficient use, and in some cases the diamond-charged copper trephines of Dr. Weagant (made for inlay work) might be necessary. I have also employed sections of thin metal tubing for forcing over the post to withdraw it when the trephine had not cut around it quite to the inner end of the post.

It is obvious that the trephine avoids the risk of running an ordinary drill along one side of the obstruction, and possibly out through the side of the root, besides preventing the formation of a one-sided or oblique hole in the root. With these advantages in favor of the trephine, the cost of a set for this purpose should not hinder their being kept at hand for these not infrequent emergencies in a large practice.—B. Q. Stevens, D.D.S., Hannibal, Mo.

A Tube for Removing Saliva.—Many designs are to be seen in the shape of tubes for removing the saliva, the objects of each designer being to prevent the tube from hurting the mouth or drawing in the soft tissues under the tongue. There is no tube in the market which does not hurt the soft tissues, and Dr. Andrews's is the only one which is not liable to draw in the soft tissues if the suction is strong. In his appliance at the side of the large tube there is a smaller one, through which the air enters. The objection is the difficulty of sterilizing this kind of tube. I overcome all these difficulties in a simple way. By having the tubes drawn from platinum they can be heated to sterilize them, and by having a minute relief hole in the top of the bend the tissues are not drawn in. Instead of an expansion in the end of the tube I leave this of the same diameter, and prevent hurting the patient by having the bend of such a length that the tube resting on the teeth hangs so as to just touch and not press on the floor of the mouth. Where there is great tenderness of the gums I use little bulbs of soft rubber which I slip on over the end of the platinum tube. A number of these can be kept in a bottle sterilized ready for use.—William Herbert Rollins.

New Mode Denture.—Before the Dental Section of the International Medical Congress at Berlin, 1890, I described the following mode of constructing an artificial denture, either partial or complete: For example, Mr. B. desired me to make for him a partial upper denture comprising the right lateral, second bicuspid, and molars, with the left cuspid, bicuspids, and molars. I first employed the ordinary method of a suction-plate with clasps and a post in the cuspid root, but the patient could not tolerate the presence of the large plate covering the entire vault of the mouth and causing constant nausea. He also complained of pain caused by the pressure of the clasps on the remaining teeth. To avoid these inconveniences I employed an original mode of construction as follows:

Fig. 1.

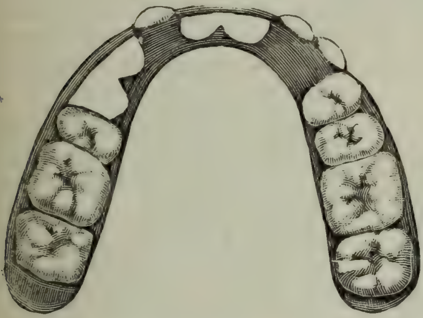
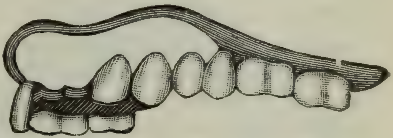


Fig. 2.



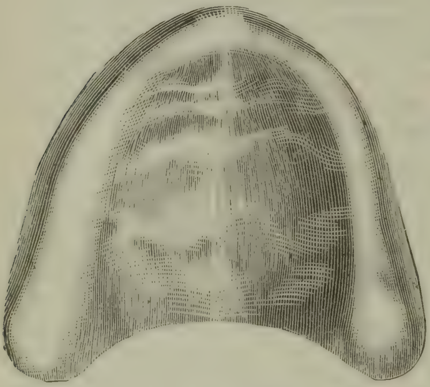
I selected a suitable tray, such as is made for the market, and fixed on it a rim of tin fashioned to follow the form of the gums, and carefully obtained an accurate impression, including the entire labial and buccal surfaces of the gums.

The plaster model was lightly scraped on the outer surface along the border line representing the junction of the muscles with the gums. Corresponding closely to this line I accurately fitted to the model a thick gold wire, which was continued around on the inside of the ridge and its ends soldered.

The artificial teeth were adjusted as usual and vulcanized onto the frame of wire, which on its labial side was left uncovered, as is shown by the illustrations, Figs. 1 and 2. Specimens of the work were exhibited, besides a practical demonstration in my own mouth. The construction of more than one hundred and fifty such successful dentures is a sufficient certification of the practical nature of the method.—Caracatsanis, Athens, Greece.

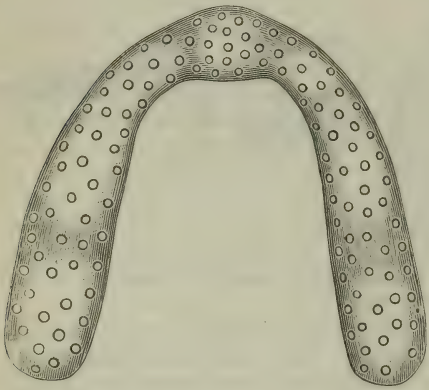
New Attachment for Vulcanite on a Gold Base.—There are many methods of attaching teeth with rubber to a gold base, but there are decided objections to all of them. My aim in producing this attachment has been to overcome these objections: to make a plate so that the edge of the rubber would not loosen from the gold, without soldering on rims, outside or inside, and without stays or pins; thus making a plate which can readily be reswaged after all the soldering has been done.

Fig. 1.



First, make the model, die and counter-die, and swage up the plate, the same as for any other attachment, using No. 28 or 30 gold plate, according to the case (Fig. 1). Take a piece of plate No. 32, and swage up another plate over the first one. Trim the edges and set up the teeth in the wax on the plate. Trim the wax as desired inside. Mark the plate at the edge of the wax on the palatine side. Remove the teeth and the wax, and then cut out the palatine portion of the outer plate as marked. Put this over the other plate and strike them up together in the dies.

Fig. 2.



With a plate-punch make a row of holes all around within one-sixteenth of an inch of the edge of the sectional plate, which now extends over all that portion of the plate proper which is to be covered with rubber. After making a row all around the edge, the rest of the surface is perforated with holes punched promiscuously (Fig. 2). If the punch is not large enough, the holes may readily be drilled larger with the engine. Take a spear-pointed drill, larger than the holes, and countersink them on the under side.

If the piece has been sprung in handling and punching, it may again be struck up in the dies over the other piece. Solder the two together, around the edge only. Always solder the inner edge; otherwise the outer edge will loosen while soldering the inner one. Never invest to solder.

Now put it in the dies and reswage, striking lightly, as, if too much force is used, the lead will enter the holes and spread out in the countersinks, thus preventing the plate being removed from the counter-die. Now the teeth may be set on, and the case flasked and finished in the ordinary manner.

This makes a strong, substantial plate. The edges of the rubber will never become loosened from the gold. This gives the best attainable results in the shape of a gold base with rubber attachment.—J. H. DOWNIE, D.D.S.

TO PREVENT FRACTURES ALONG THE MEDIAN LINE IN VULCANITE PLATES.—Replies to "H. T. N." in January COSMOS:

"H. T. N." says he has reinforced with gold wire, but without advantage. This is a common error; any wire put in a plate weakens the plate. Let him proceed as follows, which is the plan of Dr. N. W. Kingsley. If gum sections are used, grind up the set to the occlusion, and wax fast to the model. Pour plaster around the labial surfaces of the teeth and model, and when hard remove and keep as a guide for returning the teeth to position, as they are to be removed from the model. Next repeat the operation with plaster and sand, investing the two front blocks. Take all wax from inside of the arch, and remove the front blocks in the investment. Bend a piece of platinum and iridium wire so as to touch the pins of the blocks. With a fine pointed flame and fourteen-carat or eighteen-carat solder, fasten the platinum wire to the pins of the blocks, thus uniting the two blocks. Let the solder remain rough if it flows so, as that will assist the attachment of the rubber.

If plain teeth are used, proceed similarly, and unite six front teeth.

The united teeth can now be placed in the plaster guide, and that fitted around the model will restore the teeth to proper position. A plate made in this way will not fracture, nor will the front joint open.

The philosophy is that by securing the keystone of the arch, fracturing is prevented. This is a fact proven by hundreds of successes.—RODRIGUES OTTOLENGUI, M.D.S.

In addition to the usual reinforcement of a heavy half-round gold wire imbedded in the vulcanite on the lingual surface, add a piece of gold plate, say 28 gauge, or heavier if circumstances admit, bending the ends outward at a right angle to project from the finished plate at or beyond the cuspids.

In waxing up the case the strip of plate is imbedded on the *buccal* surface, the points projecting sufficiently in length to be retained and held in place by the plaster when the case is invested in the flask.

Single teeth are always preferable to block teeth in cases where median fracture is to be feared. In finishing the plate the projecting ends are cut off, and the little showing of gold does not mar the appearance; on the contrary, seems to add to its appreciation by the patient.—F. C BARLOW, D.D.S.

Use a piece of steel ribbon saw one-fourth to one-half inch wide, temper drawn, and perforated at frequent intervals.—J. A. WHIPPLE, Chicago.

It might be that the cuspids or bicuspids strike first, thereby producing a breaking pressure which a carefully corrected articulation would avoid.—W. W. JONES, Murfreesboro, Tenn.

First, attend closely to the articulation; second, after the teeth are invested, take a piece of at least No. 60 rolled gold wire, long enough to reach the bicuspids on either side, nick it with the plate shears, and bend it to touch the pins of the anterior teeth; with a suitable soldering-iron solder the wire to the pins with block tin, or soft solder.—J. M. OVENSHIRE, Dundee, N. Y.

If "H. T. N." will impress upon his patients the importance of *removing artificial dentures before going to sleep*, he will be spared the annoyances which he reports.—BERNARD HESS, D.D.S., New York.

DARK JOINTS.—Grind up the case in the usual way, and fasten the blocks slightly in their proper positions on the wax plate, then remove each block—except one of the centrals—and spread thin oxyphosphate cement on one of the ground edges, and replace it on the wax plate in close contact with the block already on the plate, repeating this until all the blocks have been replaced on the wax plate. In this way almost invisible joints may be made, whereas it is impossible to stop the joints perfectly after the case has been invested.—W. M. WADE, Richmond, Va.

DARK JOINTS.—To keep the rubber from running through the joints of gum sections, and making them dark, bevel off the inside corners of the joints a little. Take a few fibers of asbestos, twist them into a thread, and cut it into pieces a little longer than the joints. With a pair of tweezers put them into place and pack them into the joints with a thin knife-blade.—J. H. DOWNIE, D.D.S.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Here is a startling item: "To remove *blackness* from the teeth. Take *muriatic* acid, 1 oz.; water, 1 oz.; honey, 2 oz.; mix, apply with a tooth-brush, and rub vigorously." This recipe was found in glancing through the pages of "The Housekeeper's Companion," a Chicago production. It certainly would accomplish the desired object, but at what a price! Muriatic acid! Why not aqua regia?—A. M. HUDSON, D.D.S.

TEETH SCREWED INTO THE JAW-BONE.—So long ago as the year 1848, in the *Dental News Letter* for July, there was humorously suggested the "idea of making drills and screw-taps for the purpose of inserting teeth by screwing them into the jaw-bone." Is not this a clear anticipation of some modern notions in the way of making porcelain teeth with roots grooved or knobbed, and setting them in the jaw by implantation methods?—Q.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I have made a careful and thorough examination of the act of Congress passed for the purpose of taking the eleventh census, and have submitted the same to a lawyer who entirely agrees with me in the opinion that it contains nothing by which we as dentists can be compelled to answer questions propounded by the government through its special agents. There is no PENALTY attached to the law. Hence a *refusal to answer* the questions as a manufacturer is all that will be necessary.

In my opinion some steps should be taken to prevent a recurrence of what nearly proved a very serious matter to the profession. With this end in view I would suggest that each dentist write or personally see his member of Congress and acquaint him with the facts and the injury liable to be done, and also noting the exception that we alone of those practicing the healing art are by an arbitrary ruling of authorities at Washington classed as manufacturers.

Should any amendments be proposed to the present law, they can in this manner be met.—E. P. KEECH, M.D., D.D.S., 525 No. Charles street, Baltimore, Md.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

DECAY OF A REPLANTED TOOTH.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

HOWEVER solidly a house may be built, an extra nail or two may do good service when the winds blow and the rains beat upon it.

The chemico-parasitical theory of dental caries has every appearance of being built upon a solid foundation, and the various storms thus far encountered have produced not even a vibration in its framework. Nevertheless, having a nail at hand, we will drive it home, since a structure which must bear the test of ages and upon which the whole superstructure of a rational dental practice must be built cannot be too well supported. We can never learn too much about the chief source of all the many ills it is our province to deal with.

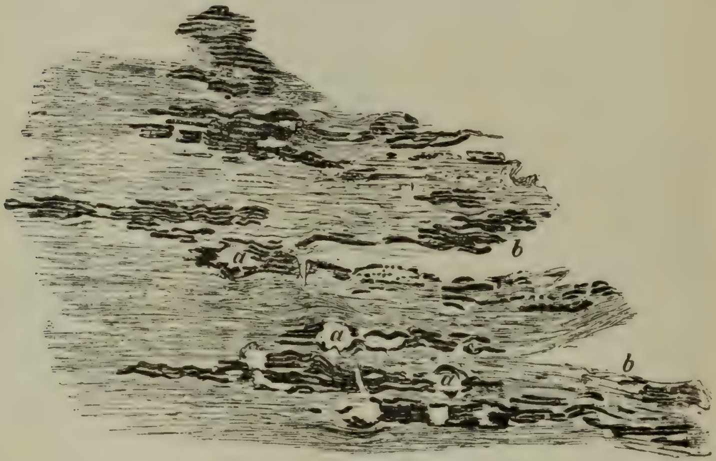
Decay of living teeth, of pulpless teeth, of dead teeth ; decay of dogs' teeth, horses' teeth, etc., and artificial decay, have all been the subject of various contributions to dental literature ; but the appearance of decay in a replanted tooth has, as far as I am aware, as yet received no attention.

The tooth in question was extracted by mistake about the first of October, 1888. After it had been out of the mouth for a fortnight the point of the root was removed, the canal filled with oxychloride, and the tooth forced into place.

When I first observed the tooth, two years later, there was a chronic fistula at the point of the root ; but notwithstanding this the tooth was quite firm. It had been filled with phosphate cement before replanting, but at the time of examination no trace of the filling was left. As the tooth was filled out of the mouth, this filling furnishes an interesting test of the durability or reliability of phosphate cement under the most advantageous circumstances. We should really have expected the filling to last longer. Perhaps the particular preparation used was at fault. The cavity was lined with a thick layer of soft dentine, as we find it in acute caries, the removal of which reduced the tooth to a mere shell, and revealed at the same time the fact that the cavity on the distal surface communicated with a smaller one on the mesial.

Macroscopically and physically examined, the decay presented nothing to distinguish it from an ordinary case of acute decay. The decayed tissue had a brownish-yellow color, an acid reaction, and had lost about thirty-five per cent. of its lime-salts.

FIG. 1.



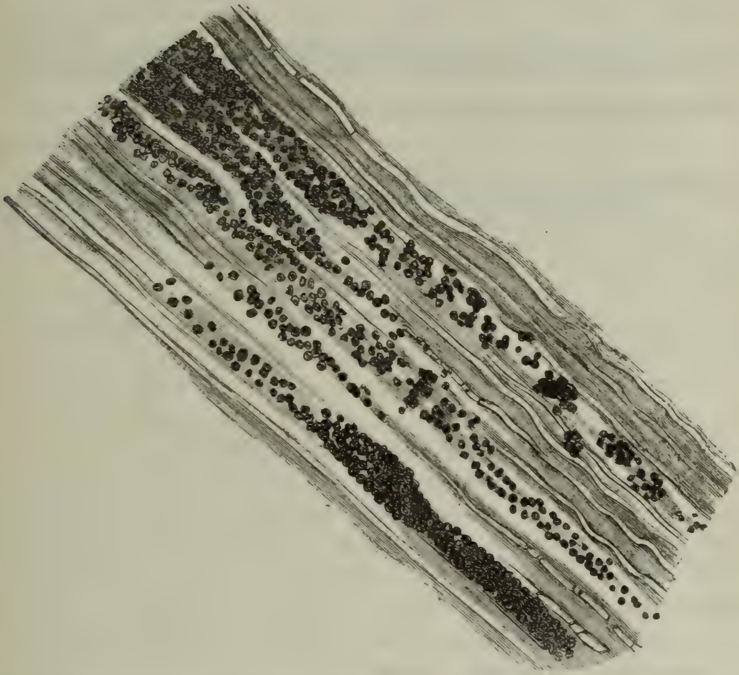
Longitudinal section of decayed dentine from a replanted tooth, showing the distended tubules; also, at *a*, liquefaction-foci, and at *b* rents due to the advanced stage of decomposition of the tissue. Low power.

Sections of the decayed dentine made on the freezing microtome and stained by the Gram-Günther method showed that while the deeper parts had undergone no structural changes whatever the more superficial layers were permeated by enormous masses of bacteria, which had distended the tubules to several times their normal diameter, and in many places had destroyed the basis-substance, giving rise to caverns or liquefaction-foci, and finally to a complete destruction of the tissue (Fig. 1).

A higher power of the microscope (350–1200) showed that the decay was caused by a so-called mixed infection, not only micrococci, as in Fig. 2, but in some places bacilli and even very long, much twisted and contorted threads being present (Fig. 3). The contortion of these threads resulted simply from the contracted space in which their development took place, and not from any natural tendency of the threads to take this shape.

The preparations also showed the fragmentation of the tubules or breaking up into short pieces, resembling pipe-stems. It is much to be hoped that some satisfactory explanation of the origin of this appearance will soon be furnished. As much as has been written about them, we are still absolutely unable to account for them. We have thus far only succeeded in showing that they are not the result of any vital action, since they occur in artificial caries also.

FIG. 2.

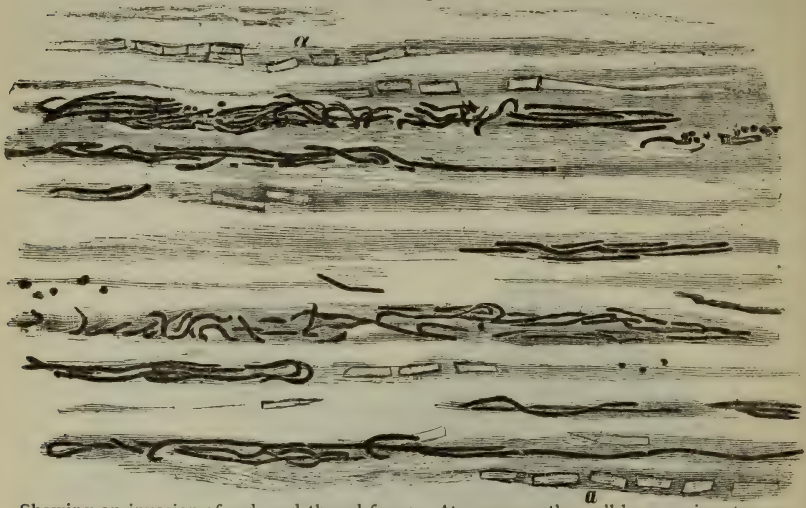


A small portion of the preparation shown in Fig. 1 highly magnified, showing the distention of the tubules by micrococci. 1100 : 1.

We find, consequently, by the examination of this case of decay of a replanted tooth, that the same chemical, physical, and structural changes have taken place as in the ordinary cases of decay met with every day.

We also find the same agents, viz, bacteria, at work in bringing about these changes. Wherever and under whatever conditions decay of dentine has been the object of exact study, the same phenomena and the same etiological factors have been found, and the mass of evidence already heaped up in favor of the chemico-parasitical theory of decay leaves very little to be desired in the way of conclusive proof of the correctness of the theory.

Fig. 3.



Showing an invasion of rod- and thread-forms. At *a* we see the well-known pipe-stem appearance. 1100:1.

THE DESCENT OF EXPRESSION.

BY ALTON H. THOMPSON, D.D S., TOPEKA, KANSAS.

(Concluded from page 194.)

Regarding the *cheeks*,—the malar bones, the zygoma, etc.,—Professor Cope says (*op. cit.*), "The cheeks are more prominent in the quadrumana. . . . In the Negroid and Mongolian races the malar bones are quite prominent, which is a quadrumanous accelerated character. The malar bones are reduced in the Indo-European races, which is a retardation, and is an embryonic condition." Most low races have prominent cheek-bones, and this peculiarity is usually an accompaniment of a low physical and mental stage. In the higher races the cheek-bones are much reduced, so that the occasional reappearance of the high malar prominence among them detracts at once from the elevation of a face. Indeed, high cheek-bones make a low face and are a distinctly quadrumanous inheritance. So we find this feature prominent and conspicuous in most low races, and reduced and inconspicuous in the higher races,—at least in the Indo-European races which *we* are disposed to call the highest of mankind.

The reduction of the cheek-bones in the higher races is not merely an accidental embryonic condition such as occurs as an accident in the non-development of the nose, for instance, so far as the individual is concerned, for "in the infant the malar bones are not prominent," and their retardation is a later human characteristic and their acceleration a quadrumanous characteristic. There is a peculiarity of the cheeks, however, that is often retained to maturity that is embryonic and a distinctly infantile feature, and that is the enlargement of the buccinator, the "sucking" muscle. The strong development of this muscle in the infant, for physiological purposes, gives the cheeks of the infant their excessive fullness, which, when the food-habits change, becomes reduced by disuse (and inheritance) and the cheek falls in, making the face thinner. The retention to maturity of excessively full cheeks, of the fleshy part, is an embryonic feature, and gives to the face an infantile look. Yet a moderate fullness is much to be desired, as plump cheeks are the inseparable adjuncts of symmetry and beauty of the face.

Regarding the *jaws*, *mouth*, and lips, Professor Cope says (*op. cit*), "The jaws in civilized man are so much retarded in development as to be quite embryonic as compared with those of the monkey or some of the lower races of man. Many of the latter are quite prognathous, and thereby approach the quadrumanous type ; but civilized jaws stop short of the full development of the anthropoid form. That is, in the monkeys the jaws are more prominent than in man, and as this results from a fuller course of growth from the infant, it is evident that in these respects the apes are more fully developed than man. The reduced jaws are characteristic of retardation. In the Negro and Mongolian we notice that there is a predominance of the quadrumanous features, prognathous jaws, which are retarded in the Indo-European ; and that the embryonic characters which predominate in the last (orthognathous jaws) are more accelerated in the others. In the Negro the edges of the jaws are prominent,—a quadrumanous characteristic ; in the higher races the alveolar borders are reduced. . . . The edges of the jaws are more prominent in the quadrumana. . . . In the monkey the jaws grow more from infancy to maturity than in man." Prognathism is a quadrumanous character, and its opposite, orthognathism, a human character. The teeth project in most low races, and are more vertical in most civilized races, and this adds to the character of the jaws, whether prognathous or orthognathous. These characters are very constant as racial features, there being but infrequent individual deviation from the racial type, and perhaps only, in the higher races, in the cases of congenital idiots, who sometimes have prognathous jaws, owing largely to the non-development of the brain-case. Darwin says ("Descent of Man''), quoting Vogt, ''Microcephalous idiots have a smaller brain, less complex convolutions, the frontal sinus is largely developed, the jaws are prognathous to an *effrayant* degree, so that these idiots somewhat resemble the lower types of mankind.'' Indeed, prognathism and a small brain-case, or orthognathism and a large brain and prominent forehead, bear a constant relation to each other. In the higher races, with greater mental power, the brain is larger,—at least the forebrain, and causes the brain-case to grow forward and overshadow the jaws, which are correspondingly and synchronously reduced. And, *vice versa*, prognathous jaws project forward of the brain-case, which is reduced and smaller. Thus it is that small, orthognathous, vertical jaws and large brain go together, and large, prognathous jaws and small brain together, as more or less constant racial characteristics.

''In the infant the alveolar borders are not prominent. . . . The faces of some people are partly embryonic,'' in having a short face and light lower jaw. Such faces are still more embryonic when the forehead and eyes are prominent. ''Retardation of this kind is most frequently seen in children, and more frequently in women than in men.'' An undeveloped, retracted lower jaw is an embryonic form sometimes seen.

In the quadrumana ''the mouth is small and the lips thin. . . . The strong, convex upper lip, as frequently seen among the lower races of Irish, is a modified quadrumanous character'' (Cope, *op. cit.*), and is quite constant in their descendants. The lips are distinctly cleaner and finer cut in the higher European races than in the lower races of man, and the oral opening is smaller. A large, wide opening to the mouth with coarse lips is a low type, and when associated with depressed corners is positively quadrumanous. These forms are often seen in low races, and sometimes reappear in individuals of the higher races. The lips are coarse and shapeless in all low races, and the finely carved lip is a distinct mark of superior organization. In the quadrumana the lips are thin and infolded, showing but little of the mucous membrane. Thus a mouth that is wide and much depressed at the corners, with thin lips and a long stiff upper lip, is positively quadrumanous. The inheritance is direct. The thick lip that shows much of the mucous membrane folded outward is embryonic. It is infantile, and remains as a permanent feature in most lower races and in some individuals of the higher races. It is the remains of the nursing period, like the developed buccinator muscle.

''The *chin* is retreating in the quadrumana, . . . and a retreating chin in man is a marked monkey character'' (Cope, *op. cit.*). That is, a chin that is retreating from the alveolar border backward as a normal condition, and not as a result of the accidental lack of development of the lower jaw, or a lingering embryonic form. The lower jaw is somewhat inconstant, and may be very small or very large as compared with the rest of the face, leading to malposition and irregularity of the teeth, as frequently observed by dentists, and the complete alteration of the expression of the mouth. But the chin as a distinct feature is independent of the form of the jaw, and occurs as a part developed upon and added to it,—the part known as the bony symphysis of the lower jaw. It is a powerful and expressive feature in man, and serves much to give character and impressiveness to the face. A bold, strong chin gives strength to a face, and a weak, retreating chin weakens a face as much as a weak, embryonic nose.

The chin is a distinctively human feature. Mivart ("Man and Apes") says, "A striking feature of the human skull is the prominence of the inferior margin of the lower jaw in front, *i.e.*, the presence of the chin. The feature is quite wanting in the Gorilla, Orang, and Chimpanzee,"—in fact, in all the quadrumana, except a slight approach to it in the Siamang. This is easily observed by comparisons of the skulls of monkeys and man. Even the lower races of man have, as a rule, retreating chins, especially when there is prognathism present, and, like that, it is a quadrumanous feature.

The descent of the *movements of expression* is an interesting part of our subject and opens a wide field, the study of which may enable us to find the origin and trace the descent of many of the expressive movements of the face of man. We notice first that many animals express emotions by the motions and movements of parts which with man have become obsolete or were never used by his ancestors. Thus the horse expresses his feelings—anger, fear, etc.—most plainly with his ears; the expressive organ of the dog is the tail; the cat expresses her feelings by the arching of the back and the movements of the tail and ears, and the standing hairs are expressive in both cat and dog. There are other expressive movements that lie outside of the facial features, but with these we will have nothing to do at present. The eyes are expressive in all animals, and in that they much resemble man.

Facial expressions, the movements of the face, were undoubtedly developed with the growth of the mind, as new emotions and mental faculties were called into existence which demanded expression. The first expression of the feelings or of the ideas was sign-language, and facial expression remains with man as a rudiment of that means of communication before the origin and development of language, for sign-language is used even by animals in expressive movements of different parts of the body, which are well understood.

Charles Darwin says ("Expression of the Emotions in Man and Animals") that he "attended as closely as possible to the expression of the several passions in animals, as affording the safest basis for generalizations on the causes or origin of the various movements of expression. . . . It seems probable that the habit of expressing our feelings by certain movements, though now rendered innate, had been in some manner gradually acquired." Again he says ("Descent of Man"), "The relative position of our features (as compared with the quadrumana) is manifestly the same, and the various emotions are displayed by nearly similar movements of the muscles and skin, chiefly above the eyebrows and around the mouth. Some few expressions are, indeed, almost the same, as in the weeping of certain kinds of monkeys and in the laughing noise made by others, during which the corners of the mouth are drawn backward and the lower eyelids wrinkled. The external ears are curiously alike. In man the nose is much more prominent than in most monkeys; but we may trace the commencement of an aquiline curvature in the nose of the Hooloch Gibbon, and this in the *Semnopithecus nasica* is carried to a ridiculous extreme."

Or again ("Expression of the Emotions") Darwin says, "When animals suffer from an agony of pain, they writhe and utter piercing cries and groans. With man the mouth may be closely compressed, or the lips retracted and the teeth ground together. Many animals grind the teeth in pain. . . . When a Chimpanzee is pleased or being tickled, a decided chuckling or laughing sound is uttered, the corners of the mouth are drawn backward, and the lower eyelids may be slightly wrinkled, but the teeth are not exposed. Their eyes sparkle and grow brighter. Young Orangs, when tickled, likewise grin and make a chuckling sound, and an expression like a smile passes over the face. . . . When given a choice morsel, the corners of the mouth are raised in a slight smile of satisfaction. The same movement expresses pleasure in meeting a person to whom the monkey may be attached." Dogs often retract the corners of the mouth and raise the lips when pleased or when displaying affection or delight. "In anger or fear the lips of monkeys are sometimes drawn up and the mouth opened and closed to show the teeth," to frighten the enemy by threatening biting. "Some species, when irritated, part the lips and gaze with a fixed and savage stare. Then the crest of long hairs on the brows may be drawn backward," and the brows be raised and lowered rapidly. "Some species of monkeys expose the teeth, others purse the mouth so as to conceal them, or pout the lips forward. Indeed, the movements of the features are really the same as those from pleasure; . . . others grow red in the face when enraged; others move the eyebrows rapidly up and down when excited. . . . Young Orangs and Chimpanzees protrude the lips greatly also when displeased. Young Orangs often kiss each other.

. . . The higher apes raise the eyebrows, and the forehead becomes, as with man, transversely wrinkled. In comparison with man their faces are less expressive, chiefly owing to their not frowning under many emotions of the mind. Frowning, which is one of the most important of all the expressions in man, is due to the corrugating muscle of the forehead ; but though the apes possess this muscle, they rarely frown,—at least conspicuously. . . . The Gorilla, when enraged, erects the crests of hair, drops the lower lip, and utters terrific yells. The great power of movement of the scalp of the Gorilla and of some others of the quadrumana demands notice in relation to the power still possessed by some men, through inheritance by reversion or persistence, of voluntarily moving the scalp. . . . Astonishment is not expressed by wide-open mouth by the monkeys, as with man."

In summing up his observations, Mr. Darwin says, "That the chief expressive actions exhibited by man and the lower animals are now innate and inherited,—that is, have not been learned by the individual, —is admitted by every one. So little has learning or instruction to do with some of these that they are from the earliest days and throughout life quite beyond our control. . . . Many of our most important expressions have not been learned ; but it is remarkable that some, which are certainly innate, require practice in the individual before they can be performed in a full and perfect manner. . . . Slight movements, such as the wrinkling of the forehead in grief, or the scarcely perceptible drawing down of the corners of the mouth, are the last remnants or rudiments of strongly marked and intelligible movements. They are full of significance to us in regard to expressions, as are all ordinary rudiments to the naturalist in the classification and genealogy of organic beings." Then again, many movements of the face in lower forms are but the beginnings, the embryonic origin, of expressions that are highly developed in man, as, for instance, the action of laughing. Of this movement we can see but the beginning, the suggestion, in lower animals. Indeed, man has been described as "the only animal that laughs," for he alone gives the movement full play. So with frowning, expression with the eye, and other facial expressive movements which are undeveloped in lower forms, but have their origin there.

Then again the higher grades of expression, those expressions of the higher emotions and intellectual processes, must have arisen after the emergence of man from the animal stage, as the animals furnish us few suggestions of them, or of the probable source of their origin or path of development. Such expressions are the human part of the face,—that which lifts it beyond and sets it apart from the animals below it. Under this head come the finer expressions of the mouth and face, which accompany that highest intellectual accomplishment, intelligible speech. Man does not indulge in the coarse movements of the mouth, as excessive pouting or strong retraction of the lips, showing the teeth, etc. (except when under very strong feeling, or as children who employ such extreme actions), but the mouth is more under restraint, and expresses the finer grades of feelings and emotions which have come into existence since man became a different being and to which the lower animals are strangers. The acquisition and development of articulate speech also led to the modification of some animal expressions and the refinement of others, and the creation of still others entirely new. But the differentiation of these is impossible in the present state of imperfect data and absence of close observation. The study of comparative expression opens up a field that is very inviting and would be fruitful of results to the careful observer.

We have studied the physiology of expression, its motives, etc., in previous articles in the DENTAL COSMOS, which supplement the present studies in comparative expression. These, taken together, give us an outline of the origin of the face and of the evolution of facial expression in man. They are, however, very imperfect for want of data and of the habit of close observation among students. This method of study is also opposed to the traditions of physiognomy which found in every variety of facial form and expression a key to character. With this obsolete theory we have no sympathy, and we have contributed what we could to its overthrow by approaching the study of the face entirely from the scientific and zoological side, following the path blazed through the trackless wilderness by Darwin, Cope, and the masters in the work of creating the New Physiognomy.

REMOVABLE BRIDGES, CROWNS, AND FACINGS.

BY EMORY A. BRYANT, D.D.S., ASPEN, COL.

It is my desire to bring to the notice of the dental profession a new method of crown- and bridge-work. I am aware of the fact that this field has been gone over and experimented upon by the leading members of our profession in this particular branch ; but I have taken my method beyond the experimental period, proved its mechanical success, and believe that time will prove its strength and stability.

In this day of advancement, when, instead of extracting sound roots, or even the diseased ones, of teeth broken or decayed off to the gums, we treat, preserve, and crown them, bringing them back to their former usefulness, it sometimes happens that the abscess was not entirely cured, and breaks out again, to the annoyance of the dentist and the disgust of the patient. We all have these mishaps, from one cause and another, and if we have a beautiful and artistic crown upon the diseased root or roots, we do not wish to destroy it in order to get to the seat of disturbance. Perhaps we have one end of an extensive bridge anchored to this crown, and in order to reach the canals for re-treatment, there is not only required the sacrifice of this one crown, but also of others, and sometimes the entire bridge. These are mishaps which bring bridge-work into disrepute. It may have been brought on by improper treatment, by lack of skill or knowledge on the part of the operator, disobedience of instructions by the patient, etc. ; yet from whatever cause, we have it to contend with in our everyday practice, and if it was not our own work it was that of some other practitioner. I am aware of the different methods of treating secondary abscess, such as amputating the roots of the diseased teeth, burring out the tissues with a rose-bur, and injecting the different restorative medicaments, but our patients will not always permit such procedures, and we are given the alternative of doing something else for their relief or of losing the work. Now, to obviate all chance of these troubles, I have brought forward my method of crowning these abutments. In the entire operation every portion is in sight,—treating the roots, filling them, and placing the anchorage posts in position ; the fitting of the crown, and the final securing to the anchorage pins and the root or roots. If the work is done anywhere near right, each part will and must fit to a mechanical nicety, going to its proper place exactly, there being no guess-work about it and no danger that the cement used will not get into all the required parts. To all outward appearances, and upon all teeth and crowns but those from cuspid to cuspid, there is no apparent difference from that of former methods. The difference is in the arrangement of the internal parts. These I will proceed to explain.

Prepare the root or roots to be crowned the same as for other cap-crowns, cut and fit the band, use pure gold, or twenty-three carat rolled-gold plate, about No. 28 gauge, the beveled edge of which should come just under the free margin of the gum, and fit exactly to the contour of the root and as tight as possible. In fitting this band, it should not be driven up under the gum until the tissues are bruised and torn, but just to the margin or edge and marked off with a sharp instrument, as near as possible to the contour of the margin, removed, cut out to the marked line, and then beveled for about a thirty-second of an inch with a file. Replace it on the root and gently drive it up to the edges of the gum, examine all around to see that the beveled edge will go under the free margin evenly, tap it gently until entirely under, mark off on the inside of the band where the top of the root is, remove the band and cut off to the marked line, then place this edge against the side of a smooth corundum wheel on the lathe, and grind this surface perfectly smooth and level. Replace the band upon the root to be sure you have not deranged the shape or contour, remove carefully, and solder on the top a piece of perfectly flat rolled-gold plate, twenty-two carat fine, using twenty-carat solder, and flowing it upon the outside of the band at least a thirty-second of an inch across the bevel of the flowed solder. (This band can be dispensed with altogether.) Trim the overhanging edges down to the edge of the solder, leaving that to finish up with (Fig. 1). Place the anchorage post in position in the root-canal, and see that when secured the top will be a little rearward of the center (Fig. 2). For these posts you can use the posts which I provide for the purpose (Fig. 3), or the How metal screw-posts and the nuts provided with them. Remove the post and fill the root-canal with gutta-percha, heat the post and push it to its place, smooth off the surplus which has oozed out, put some ink on the top of the post-head, and place the cap down over the root till it touches and leaves a mark. With a punch suitable for the purpose punch the hole (*d*, Fig. 1) to receive the post-head. Place the cap in position on the root, mark off the post-head to the thickness of the nut to be used, remove the cap, and with a corundum wheel in the engine grind the post-head down to the marked line, trim off the rough parts, and screw on the nut to restore the threads; then remove the nut and place the cap in position on the root. If it is to be a bridge, and more than one abutment is to be used, proceed the same with the other abutments up to this point. We are now ready for the bite, which I take in wax, remove the bite carefully and take the impression, in which the bands or caps should be removed if possible. This impression should always be taken in plaster. After removing the impression, if any of the caps have not come away with it, remove them carefully and place them in their positions in the impression. Varnish the impression, oil it, being careful not to get any oil on the caps, and pour the plaster for the model. Remove the model from the impression and set it up on the articulator, place the bite in position and run plaster in the same, connecting with the other half of the articulator. We are now ready to proceed with the making of the abutment crowns. Select the facings to be used from the ordinary veneer facings now on the market, color, shape, and size regarded. For the backing material I prefer platinum rolled plate, No. 28

FIG. 1.

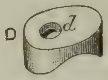


FIG. 2.

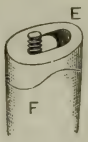
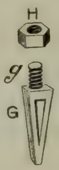


FIG. 3.



gauge. Grind the necks of the facings (Fig. 4) to fit the cap and perfectly smooth, then grind out a recess (*a*, Fig. 4) large enough to go round the anchorage post nut from the back, being careful not to mar the front or edge of the facing where it touches the cap. Mark on the backing points opposite the facing-pins and punch the holes to receive them, place the facings on the backing (Fig. 5), the pins extending through the holes, and left straight. Mark the shape of the edges of the facing on the backing, remove the facing, and trim nearly to the mark. For the anterior crowns I use a peculiar cone-shaped platinum cylinder (A, Fig. 6), and for the posterior crowns and the dummies I employ a straight cylinder (B, Fig. 6), the length of each cylinder being about an eighth of an inch, the small end of the cone and the inside of the straight cylinders being just large enough to slip over the platinum pins of the facings. Place the small end of the cone cylinders into the holes punched for the facing-pins, extending through the backing about a thirty-second of an inch, adjust them so they are parallel, place on a piece of charcoal or soldering-block, and with a pointed flame directed upon the joint between the backing and the cylinders flow enough twenty-carat solder to make a firm attachment. Care should be taken not to get too much heat upon the backings and the cylinders, or the gold will flow over and close the ends of the cylinders. With a small corundum wheel in the engine grind off the projecting cylinder ends and the solder, punch and cut out of the backing (Fig. 5) over which the platinum box C is to fit, a slot a trifle smaller than the edges of the box to be soldered over it. Proceed the same with the other anterior crowns. Place the facing on the backing, the pins extending into the cylinders; burnish the edges of the backing to the edges of the facing, smooth them over with a file, or corundum wheel in the engine, put the cap in the position it is to occupy, place the platinum box in its position over the anchorage post hole; if the edges of the box do not fit up to the backing and to the cap, grind the edges till they do, and retain in place with wax cement. Proceed the same with the other anterior crowns. They are now in position to solder (Fig. 7).

FIG. 4.

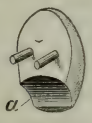


FIG. 5.

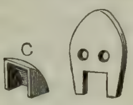


FIG. 6.

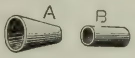
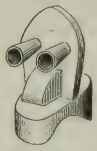


FIG. 7.



We may suppose the posterior abutments to be molar or bicuspid devitalized roots, the canals enlarged, treated and prepared for the reception of the anchorage posts, the canals filled as explained for the anterior roots, the anchorage posts in their proper positions, and the caps, with holes made for the post-heads, in position upon the roots. The straight cylinders (B) are used for these crowns, soldered to the backings, smoothed down, the facings put on, and the ends are pinched together just beyond the ends of the facing-pins in the cylinder, and cut off close enough to the pins to leave the ends closed perfectly. For the cusps of these crowns and the posterior dummies either use the cusps on sale at the dental depots, or strike up a cusp of the desired shape and size from either pure gold or twenty-three-carat fine rolled-gold plate, flow the cusps full of twenty-carat gold solder, and flush with the edges, trim the edges, and grind the soldered part perfectly smooth and flat on the smooth side of a corundum wheel on the lathe, grind the cutting-edge of the facing and backing to fit the smooth surface of the cusps, and flow some cement wax over the cylinders, backing, and cusps to hold the parts in place.

To articulate the cusps to the antagonizing teeth, remove the facing and grind down to what is nearly right, place the facing on the backing and grind the backing down to the edge of the facing; place in position, and if not short enough, grind off a little at a time till the articulation is correct and the ground edge fits the cap perfectly, the same as for the anterior crowns. Remove the facing and cut out the hole in the backing for the insertion of the anchorage post nuts, reburnish to the facing, place the cusp in its position on the backing and the facing in its proper position, retaining it by cement wax as before. Place in position on the cap, place the platinum box (C) in position covering the holes in the backing, and add cement wax over the whole to the amount and shape you desire the gold backing. The cylinders may project above the box the same as for the anterior crowns, or into the box in case of a short bite.

In making the dummies, the backings for the facings, the cusp, and the preparation of the cylinders are proceeded with the same as described for the posterior crown abutment, with the exception that there are no caps or boxes to fit. The backing is fitted to the facings, holes punched for the cylinders (B), the latter soldered to the backing, trimmed up, the ends of the cylinders closed, the cusp fitted in position, and all cemented together with wax.

We now proceed to solder the parts. Remove the abutment crowns from the model, remove the facings from both the crowns and the dummies, mix thinly some pumice and water, and fill the holes and the box covering them, of the crowns, and all over the backings and up to the overlapping cusps of the dummies and posterior crowns, being careful that it goes to all the joints and coves in every part, to be sure that no surplus solder will run over these parts. Mix your investing material (I prefer equal parts of pumice and plaster), invest the crowns and dummies, dry the investments, and heat out the wax. Flow eighteen-carat gold solder into the spaces formerly occupied by the wax, to the shape and amount desired. Plunge the investment into cold water, clean off the remaining investing material, and shape up the crowns and dummies with a small corundum wheel in the engine, smooth with sand-paper disks, and polish with pumice and water on the lathe. The finer you finish at this point, the more artistic will be the finished work.

Now for the final soldering and fitting. Place the abutment crowns in position on the roots, screw the anchorage post nuts tight to their place, replace the facings, take the bite with wax as before, remove the facings, unscrew the anchorage post nuts, being careful not to displace the caps, replace the facings and take an impression of the whole in plaster, allowing it to set till it has a firm hold on all the crowns. Remove with the crowns inclosed, and run the model and bite and place on the articulator, as before explained. When ready, place the facings on the dummies, articulate to the antagonizing teeth, wax the dummies in position, withdraw the facings from all the dummies and abutment crowns, invest, heat out the wax, and proceed to solder the whole together with eighteen-carat gold solder. Plunge into cold water, clean up, and after removing all the rough places with the corundum wheel in the engine, remove the scratches with sand-paper disks, polish with pumice and water, using a felt wheel on the lathe, and put on the high or finishing polish with felt wheel and jeweler's rouge.

We are now ready for the final setting of the work. Serrate the pins of the dummy facings with a thin mounted disk in the engine, mix some cement thin, place it over the pins, back of the facings and the edge which butts against the overlapping cusp, and push them home. When the cement hardens, remove the surplus. If anterior dummies are used, place thin cement over the backs of the facings, and screw them home with the nuts (Fig. 8) provided for the purpose. All facings are now in place but those of the abutment crowns. Dry the roots to be covered by the abutment crowns, place some thinly mixed cement round the inside of the caps, and push the denture to place; before the cement hardens, place the anchorage post nuts in position and screw them to place. Pack the remaining space in the platinum boxes with gutta-percha till full and flush with the backing. With a screw tap made for the purpose, cut the screw threads upon the abutment facing pins (Fig. 9), place some thinly mixed cement over the backs of the facings, but not on the pins,

FIG. 8.

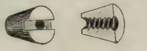
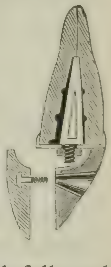
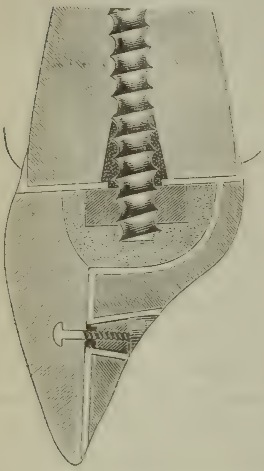


FIG. 9.



push to place and screw home with the nuts (Fig. 8) made for the purpose. These nuts should have the same taper as the cone cylinders. Fig. 10 shows, in magnified section, this form of the attachment, employing a How screw-post and nut.

FIG. 10.



To remove the bridge, unscrew the facing-pin nuts of the anterior abutment crowns, loosen the posterior abutment crown facing with a sharp-pointed instrument, and remove the facing; remove the gutta-percha filling in the platinum box, unscrew the anchorage pin nuts, and with a little motion the bridge will come loose and can be lifted off. The anchorage posts can be removed by applying heated pincers to the pins till the gutta-percha is softened. This gives you direct access to the root-canals for re-treatment. In case you use an all-gold crown for the posterior abutment, and wish to have a removable bridge, I provide a platinum cylinder, screw-threaded inside, with a pin to fit; cut the cylinder in two diagonally at the center, solder one part to the gold crown, the other to the dummy next the abutment crown and right above the other cylinder. When the bridge is in place, screw in the pin and it gives a perfectly solid attachment. This attachment allows using roots which are not parallel for abutments for bridges.

This system can be used with any other method of attaching the facings of the dummies, but the anterior abutment crowns, and the posterior when roots are used, must be by the cylinder method, in order to reach the internal attachments in the platinum boxes. Although this method may appear intricate and lengthy, yet with the cylinders, nuts, pins, and tap at hand it is no more trouble than any of the methods now in use.

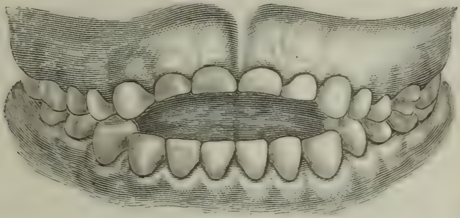
PORCELAIN DENTAL ART.

BY W. A. CAPON, D.D.S., PHILADELPHIA, PA.

THE advantage of porcelain as a means of making artistic dental operations has long been known, but the difficulties attending its successful manipulation have been so various and discouraging that not many dentists have pursued such seemingly profitless and necessarily expensive experimenting. A few, however, have persevered, and their efforts have been rewarded with success. No improvement in dentistry during the past decade will compare with this. By its use painful and difficult operations are reduced to the minimum and are artistic in wonderful degree. In illustration of this the following case of extensive erosion is presented.

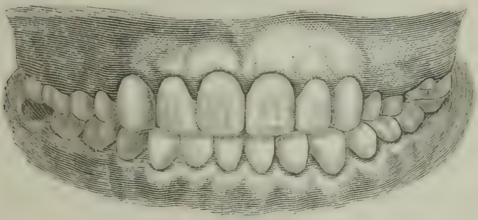
Miss C., of Philadelphia, aged twenty-two, nervo-lymphatico-sanguine temperament, of good health, had suffered from gradual loss of tooth-structure, which commenced about five years ago, resulting in the condition shown in Fig. 1.

FIG. 1.



The deformity was very unfortunate for appearance, and the speech was very much affected. Biting and masticating were difficult and often painful from the close proximity of the pulp to the surface. To overcome this one of the many devices as suggested by Dr. C. H. Land, called the "jacket" crown, was employed, and made as follows: After reducing the teeth with engine corundum wheel as much as possible without producing pain, a tube of platinum, gauge 32, was closely fitted to the necks of the teeth, then soldered as in ordinary band-work. The palatine portion was then ground flat or slightly concave, and another piece of platinum soldered to it to give a natural palatine contour. The labial surface was then ground in a similar manner, which reduced the tube to a wedge shape. After fitting and burnishing closely to the teeth, a thin porcelain veneer was placed in position by adding porcelain body and baking in a small gas furnace. The crown was once more put in place and occlusion noted, more body being added where indicated. After baking from five to seven minutes it was ready for attachment by cement, as in other crown-work. When finished it presented the appearance shown in Fig. 2.

FIG. 2.



Thus six superior oral teeth with live pulps were incased in a durable and artistic manner, the operation causing no pain nor inconvenience. For anchorage we have the natural teeth themselves, with the great advantage of easy entrance should pulp-trouble occur. The palatine surface being platinum, offers a means of easy and quick access. This jacket crown has been used in every portion of the mouth successfully in every respect, but is especially indicated for "peg" or "rice" teeth, pitted or "measley" teeth, or any other disfiguring deformity, especially when attended by sensitiveness ; also in cases of darkened and devitalized teeth, or where unnatural spaces exist. Such defects are remedied in a manner so satisfactory and so speedily that all must admit that an operation of this character overcomes in a practical manner what were heretofore insurmountable obstacles in operative dentistry.

THE INFERIOR MAXILLA AND ITS RELATION TO THE SEVEN AGES OF MAN.

BY ROBERT M. SOLOMONS, D.D.S., CHARLESTON, S. C.

AMONG all the two hundred bones of which the human frame is composed, there is none, perhaps, more calculated to excite the interest and admiration of the student than the inferior maxilla. In the variety of its features and the diversity of its functions it has no equal in the entire animal economy. Whether considered from the dental stand-point or in its relation to physiology, anthropology, physiognomy, or geometry, it is none the less interesting. To the dentist, familiar with the essential part that this bone plays in the development, eruption, and maintenance of the teeth, nothing need be said in this regard, nor of its all-important relation to the functions of speech, mastication, and digestion ; while to the mathematician the directing hand of an all-wise Master Mechanic speaks from its every angle and part, and is everywhere shown in the employment of apparently insignificant advantages and the accurate adjustment of each particular part for the performance of the work of the whole.

There is law and order pervading every part of the jaw, a wise design being apparent in the arrangement of the teeth and jaws in consonance not only with the laws of geometry, physics, and mechanics, but according to the most approved methods of modern science for the economy of force.

To the naturalist and comparative anatomist what can be more interesting than the articulation of the human jaw ! A triple arrangement of the inferior maxilla with the temporal bones in such manner as to combine the advantages of the perpendicular, hinge-like joint of the carnivorous animal with the flat socket or laterally moving joint and the long, narrow articulation which gives the backward and forward movement of the ruminant. Man is, therefore, omnivorous, and here is found one of the many proofs of his position as head of the animal kingdom.

When we look at the bone through the eyes of the anthropologist, we find that as a means of racial distinction it presents landmarks as fixed and reliable as any to be found in the skeleton. In the Caucasian race, for instance, we have the shortening of the jaw and perpendicularity of the front teeth such as to give rise to that prominence of forehead and chin so characteristic of the face of the well-formed European and his descendants. The inferior maxilla of the Negro, on the other hand, exhibits closer approximation to the lower order of vertebrates in its greater massiveness, the depth of its body, the slant backwards of its anterior alveoli and teeth, and in the greater obtuseness of the angle of its horizontal and ascending portions, the last-mentioned fact being of especial importance to the dentist as accounting in a measure for the less frequent occurrence of trouble and irregularity in the eruption of the lower wisdom-tooth among black people than among whites.

To Dr. Henry C. Boenning, of the Philadelphia School of Anatomy, belongs the credit of having made a discovery which further increases the value of this bone as a means of distinction between the races ; namely, the peculiar relations which the alveolar sockets bear to one another. Given, for example, an inferior maxillary bone with all the teeth removed, but their sockets so preserved as to show the direction of their vertical and transverse axes. If now a section be made a few lines below the free border of the alveolar process so as to bring the openings of the alveoli on the same plane, such a section will exhibit a series of ellipses, each socket being conoidal in form, with the base of the cone at the place of opening. If the long axes of these ellipses be now successively extended inward so as to intersect a line drawn antero-posteriorly from the nasal spine to the occipital protuberance, it will be found that their several points of conjunction will form a series of constantly increasing angles. This, as a general rule, is found to be the case in the higher races of mankind, and in passing backward from the incisor to the molar teeth the angles gradually increase to such an extent as to finally exhibit an approximation to a right angle. As we descend in the scale of humanity, the lower the race the less pronounced the angle. In the descending scale irregularities frequently occur, so that instead of the angles uniformly increasing, the axial lines not infrequently intersect one another. The well-formed dental arch in the higher types of mankind will, however, clearly exhibit the increasing angles of the conjugate axes of the teeth with reference to the antero-posterior line through the middle of the base of the skull.

These conclusions, reached by Dr. Boenning after several years' consideration of the subject, were confirmed by the examination of a large number of skulls in the fine collection of crania at the Academy of Natural Sciences.

One of the most remarkable and interesting features of the inferior maxilla is its difference in form and character at various periods of life. From the time of birth to the time of death it is constantly in a state of transition. The changes vary according to the life of the individual, and may be said to correspond with the seven ages of man as depicted by Shakespeare.

Take, for illustration, the natural anatomical history of the inferior maxillary bone of an individual of ordinary longevity. At birth the bone is still in halves ; the dental groove is of considerable magnitude and runs along near the inferior border of the bone ; the alveolar arches, containing the germs of the teeth, are large and prominent ; the coronoid process is of large comparative size, and stands up boldly at right angles from the rest of the bone. The body and ramus form an angle of from one hundred and sixty to one hundred and seventy degrees, and this straight configuration of the jaw together with the non-development of the antrum of Highmore gives the rounded, flattened face of the "mewling, puking infant."

Later the two parts of the bone become united at the symphysis menti, the first dentition is completed, the angle of the jaw is reduced to about one hundred and thirty degrees, and simultaneously with the eruption of the permanent teeth we have the appearance of the "whining school-boy, creeping unwillingly to school."

At the age of about twenty years the angle of the jaw becomes about one hundred and ten degrees, the second dentition is about being completed, the dental canal is in the middle of the bone, and the face of the individual assumes that symmetry of outline and beauty so characteristic of the ideal "lover, sighing like a furnace."

Later on these give place to the sternness and decision of mien which so become the "soldier, jealous of honor and quick in quarrel," features which are supposed to be the outward signs of a jaw-bone dense and solid in structure, sharp and well defined in outline, with the vertical and horizontal portions nearly at a right angle and the alveolar and basilar portions so nearly counterbalancing that the mental foramen now stands about midway between the superior and inferior borders of the body of the bone.

Next comes the "justice, full of wise saws and modern instances." At this age of life, about forty-five years, most people, especially the learned members of the judiciary, have cut their wisdom-teeth, but the coming of the dentes sapientiæ has been followed, perhaps, by a compensating loss in the evenness and continuity of the structure of the bone and other changes indicating that the climax of life has been reached or passed.

It is not, however, until the individual has shifted into the "loose and slippered Pantaloon, with spectacles on nose and his big, manly voice turning again toward childish treble," that the shrinking of the alveolar process, the loosening of the teeth in their sockets, the spreading of the angle of the jaw, and other signs of retrograde metamorphosis make themselves apparent.

The seventh and last stage is second childhood in the individual, corresponding to the edentulous state of the bone in infancy. As the years advance, the alveolar process is absorbed, the teeth drop out, and the bone again becomes shallow. Whereas in infancy the alveolar process constituted the chief element of the body of the bone, it has now become absorbed and the lower or sub-dental portion only remains, so that the mental foramen, which had been near the lower margin of the bone, is now found quite near the upper edge. In order to permit the jaws, now deprived of their teeth and alveolar processes, to be brought into something like approximation, the angle of the jaw has again become widened to about one hundred and thirty-five degrees. As a consequence of these changes the jaw is elongated and the chin thrown forward, so that when the mouth is closed the chin and nose approximate each other. Then it is that the individual, "sans teeth, sans eyes, sans taste, sans everything," at last reaches the state of dissolution, his jaw-bone having completed its wonderful cycle of transformation.

NOTES ON THE TREATMENT OF PULPLESS TEETH WITH ARSENIOUS ACID.*

BY M. H. FLETCHER, M.D., D.D.S., CINCINNATI, OHIO.

THE late experiments of Professor Miller seem to have put us in the way of treating pulpless teeth more intelligently, for the reason that we now have some facts as to what kind of germs we are dealing with. We do not question that they have already been successfully treated by the intelligent practitioner, yet we have not been treating these conditions with a specific idea of the kind of life we are trying to destroy. I venture to suggest a plan (not entirely new) by which both patient and operator may be saved time and annoyance. The theory is first that gas-forming bacteria must be gotten rid of before these cases can be successfully disposed of, and that this condition can most quickly and conveniently be accomplished by the use of arsenious acid or other strong germicides. I first venture the statement, that there is no lesion of the tissues of the body (not self-limited) more amenable to treatment than the one in question. This is proven by the many and various kinds of treatment suggested and practiced. Many operators go so far as to say that they "never lose a case." While they believe this to be true, it is probably safer to say their loss is exceedingly small. Now if it be so simple a process to treat these cases successfully, it should also be a short process.

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* From the President's address before the Mississippi Valley Dental Association, Cincinnati, March 10, 1891.

Dr. George Cunningham, of Cambridge, England, gave three years ago a paper and statistics on the treatment of such teeth with arsenious acid. He says of their curability, "The success of the operations seems mainly to depend on the old axiom, 'The cause being removed, the effect ceases.' No observant operator can have failed to notice the inherent curability of abscessed teeth. Who has not noticed the frequency of cicatricial tissue marking the existence of former fistulous tracts, even where the putrefactive contents had been allowed to remain? It is to this inherent property of spontaneous curability that we look for the relief and cure of all the injurious conditions arising from a putrescently diseased pulp." Dr. Cunningham designates the arsenical treatment as the "immediate method," and the other and longer processes he calls the "dressing method."

We do not claim originality in what we wish to present, except possibly the formula used, and the manner of its use. Dr. Cunningham gives the following:

℞—Arsenious acid, gr. ii;
Alcohol, fʒ i;
Oil of cloves, fʒ i.

He reports a loss of only three teeth out of five hundred and twelve treated. Our own formula is:

℞—Arsenious acid, gr. ii;
Precipitated chalk, ʒ i.

Add glycerin to make a thick paste.

(Arsenious acid is only slightly soluble in water, one part dissolving in about fifty of water, and slightly more soluble in glycerin, so that only small portions of arsenic would be carried to the pulp-chamber. No chemical union results from the mixture of arsenic with the chalk.)

The latter formula I consider better, because it is more easily manipulated, and, in consequence, is less dangerous to surrounding tissue: 1, because the quantity is small by its admixture with chalk; 2, because the quantity is easily measured by the eye, and, being in a semi-solid form, is not likely to be forced through the apical foramen as a fluid might, while yet there is present an ample quantity to be a thorough germicide. The dose of arsenic is from one-twentieth to one-fourth of a grain; the stomach of an adult readily takes up this quantity. But in its use as we recommend there is probably not more than one-fortieth of a grain applied in any case, and this not in contact with soft tissue at any place unless it be forced through the foramen; and should this occur, and there be a pus-sac, the one-thirtieth or one-fortieth of a grain of arsenic would most probably be good treatment for it, acting upon the pus and destroying bacteria, and having done its work would become absorbed by the blood-vessels with no destructive effect upon the tissues.

It may be used as follows: Take of the arsenical compound about half a grain, a portion about equal in size to half a grain of wheat, place this upon a glass slab and mix with it a drop of water from the end of the finger; then with a nerve-broach covered with cotton mix the two thoroughly. This is introduced into the pulp-canal, which has been previously cleansed, dried, and washed with alcohol, being careful to get the canal thoroughly filled. Then dry out again, and, in the majority of cases, fill immediately both roots and crown with any material desired. Teeth with small and tortuous root-canals, into which it is difficult to explore or force a fluid, are probably better left with the dressing in for a few days.

My statistics (one hundred and forty-eight cases in the past eighteen months treated after this manner) show only two cases from which the dressing had to be removed to give relief from pain.

Another advantage in the use of the arsenic in this form is that small particles of the salt are carried with the solution into the root-canal and remain there. The continual presence of such a germicide in the pulp-chamber and canal is perfectly legitimate, since the canal is in no way connected with the circulation after the death of the pulp, and has no connection with the cementum which will allow the passage of any destructive agent.

These canals, if not filled nor sterilized, would most likely cause trouble sooner or later. According to Dr. Cunningham, they may be safely left without filling if kept thoroughly antiseptic. The plan adopted by him was to cleanse the pulp-chamber and larger root-canals, then cover one side of a piece of paper with his arsenical compound and put it into the pulp-chamber with the arsenic side toward the canals, then proceed to fill upon this with a cement, finishing with any other material desired.

The plan of using cotton saturated with carbolic acid and other antiseptics and filling over them is one of the oldest of the many methods; but have we not all been obliged to remove many such dressings after they have had time to become useless as antiseptics? The list of agents and plans for dressing root-canals is too long to give now; but according to our experience nothing so completely fills the requirements in every particular as arsenious acid. Fowler's solution might be used, but its strength is not always certain, and there is no crystal of the salt left in the canal to keep it antiseptic. We have also tried a solution of bichloride of mercury, and even with a 1 to 1000 solution trouble ensued. The powdered bichloride might be used in the same manner as the arsenic, but it is so much more soluble in water and so dangerous to tissues that it is less desirable.

According to Professor Miller, some very active agent must be used to sterilize a pulp-chamber. On page 97 of his late work on micro-organisms he says, "Attention has already been called to the fact that the dental pulp presents in a high degree the conditions essential to the formation of spores, and since spores possess high powers of resistance, the antiseptic treatment of root-canals is thereby rendered more difficult."

The necessity of destroying these germs is clearly set forth in the same work, page 111, where he says, "I would call especial attention to five different gas-forming bacteria, which invariably form large gas-bubbles in the gelatine, or tear it to pieces, as represented in the figure. One of these bacteria, which generates considerable quantities of gas in albuminous substances, I found in the human fæces as well as in a gangrenous tooth-pulp. Its appearance in the latter place may help to explain the frequent occurrence of dental abscesses. If a tooth be filled before removing the necrotic pulp and sterilizing the root-canals, the gas formed will force itself through the foramen in the apex of the root, or carry particles of the putrid pulp along with it, causing irritation, if not immediate inflammation, of the pericementum."

Thus it would seem, not only from recent investigations, but from the past experience of most practitioners, that the agents used have been such as would destroy organisms and spores, whether they were used with this idea or not. But in many cases the teeth were kept sore for weeks, and sometimes for months, by the frequent introduction of steel points or medicaments, each time introducing a few more bacteria, while explaining to the suffering patient that the case was a most difficult one to cure. On the other hand, the rational treatment would seem to be that of removing the exciting cause by thoroughly sterilizing the pulp-chamber and canal in the shortest possible time. Exciting causes may be foreign bodies, either fluids, solids, or gases, all of which are accompanied with bacteria. Once these influences are removed, the spontaneity of tissue is such that it will soon return to its normal condition. If the idea of the natural tendency of tissue to return to its original state can be thoroughly instilled into our minds, and also that we are simply to allow the living tissue to do what it is continually trying to do, then the treatment of abnormal conditions is greatly simplified. Time will be saved to patient and operator, and we will soon find ourselves in touch with nature, which means immediate success in many cases where we now have much trouble.

Keeping in mind the old axiom, that "the cause removed, the effect ceases," our trouble in the treatment of pulpless teeth is reduced to a minimum, and our patients saved both time and annoyance.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, February 11, 1891, in the new building of the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. M. C. Gottschaldt, chairman of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic of the society was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, Broadway and Ninth street. The number in attendance was one hundred and seventy-eight. . . . Dr. C. A. Timme, of New York, repeated his clinic on glass filling. In conspicuous cavities of front teeth where gold is certainly objectionable, glass filling, from the accuracy and ease with which the color of the tooth and gum can be matched, would seem from present indications to be the proper material to employ. This addition to our filling-materials was generally commended by those present. . . . Dr. W. R. Blackstone, of Manchester, N. H., was unavoidably detained, and will give his clinic at a subsequent occasion. . . . Dr. E. B. White, of Philadelphia, Pa., gave two very instructive clinics. The first was the repairing of broken bridge-piece without removing from the mouth. Perhaps the most puzzling feature in connection with crown- and bridge-work at the present day is the renewal and adjustment of porcelain facings in place of fractured porcelains, without removing the piece from the mouth. But few methods have been devised. One is to select suitable porcelain, and lengthen or shorten the pins to correspond to the thickness of plate on which it is to be fastened. Pins can be lengthened by fusing pure gold to the ends, pure gold being preferable to an alloyed gold because of its great affinity for platinum, and also on account of the ease with which it can be worked. Holes are then drilled into the bridge in the position to allow the porcelain to fit perfectly, and are countersunk on the palatal or lingual surface ; the facing is put in position and fastened by riveting the projecting ends with a plate-punch, to perfectly fill the countersunk portion of the hole. A small quantity of cement of creamy consistence should be put under facing to fill any space where it is not in perfect contact with metal. When the cement has hardened, the rivets should be ground and polished. A method that makes a perfectly strong attachment, and one that can be very readily applied to any of the six anterior teeth and with but little more work to posterior teeth, is to solder a piece of round platinum-pin material between pins on facing (Fig. 1), allowing it to just reach through to the inner surface of bridge, and upon it cut a fine thread nearly its whole length. The pins in facing should be shortened to about a line in length, and corresponding depressions made in the labial surface of crown for the insertion of pins to prevent rotation. Drill a hole in bridge (Fig. 2) of just sufficient size to insert pin, enlarge it from palatal or lingual side about a line in depth and about one size larger in diameter than the pin, make a nut to fit the enlarged portion of hole, and cut thread through the center to fit pin on porcelain (Fig. 1). The facing is adjusted by screwing the nut firmly to place, and will be perfectly solid and not liable to loosen as when riveted. Figs. 3 and 4 show the complete repair. . . . Dr. R. Walter Starr, of Philadelphia, put in a piece of bridge-work, consisting of two bicuspids supported by the root of the second bicuspid, the first bicuspid having been lost. The tooth was shaped with safe-sided diamond disks and corundum points. The measure of the root was taken by twisting wire around it, which, on being removed, cut open, and straightened out, gave the size for the gold band. The strip for the band should be cut the thickness of the metal shorter than the wire, and the ends soldered, placing the seam on the inner side. The cusps were struck up and filled a little more than flush with eighteen-carat solder, the ferrule filed flat to fit the cusps, and both wired together. A quantity of flux was placed at the joint, and the whole fused together with the solder in the cusps. This cap was placed on the root and an impression taken by placing composition-material between the teeth and having the patient bite into it. Plaster was

FIG. 1.

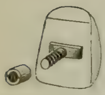


FIG. 2.

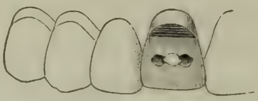


FIG. 3.

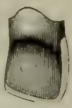
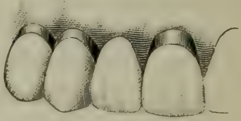


FIG. 4.



run into this, and when hardened it was broken at the ends, thus forming the articulation. A suitable plate-tooth was backed with platinum, ground to fit, and united to the cap. Dr. Starr prefers The S. S. White Co.'s twenty-two-carat gold, because it contains no copper and is very pliable. The piece was set with Baldwin's cement. All who saw Dr. Starr operating, and the result in the mouth, expressed themselves as well pleased. . . . The Chase Combination Dental Plate Company exhibited samples of their work. . . . Dr. Burton C. Russell, of Keene, N. H., demonstrated the inlaying of porcelain with porcelain rods. This method applies to that class of cavities frequently met which appear on the faces of the front teeth, and whose shape and size make it advisable to form into a circular cavity. The operation is thus described : After removing the decay in the usual way, make the cavity round and true with an inlay bur of required size. With this bur cut into a piece of ivory or toothbrush handle, and this will serve as a guide in grinding a porcelain rod. Select a tapering porcelain rod of the same color as the tooth under treatment, cut it off where its diameter is somewhat greater than that of the inlay bur employed, and cement this rod into a porte polisher. If those at hand are too small to take the larger end of rod, one can be constructed by rolling a strip of thin copper, half an inch wide, around a small lead-pencil or large-sized orange-wood stick, and tacked with soft solder where the ends meet. The tube thus formed is then cut from the strip and filled with jeweler's black wax. A broken engine-instrument can then be heated up and pressed into one end and trued up by revolving in the hand. The porcelain rod is then heated and pressed into the open end and into the softened wax, and while it is yet pliable trued up as before. This is placed in the engine and the rod turned down to the diameter desired by revolving it against a corundum wheel or diamond disk turned in the opposite direction in a lathe or another engine. When the rod will fairly enter the cavity, it is ground home with the engine, wetting frequently to avoid heating. No grit is required, as the roughened surface of the rod will cut its way into the tooth quite fast and make a perfectly tight ground joint. When it has ground home, remove from the hand-piece and mark the depth of the cavity on the rod with a pencil, allowing plenty to finish. Weaken the rod at this point with a disk, spread a small quantity of thin, fine-grained cement on end of rod, and, while held in the porte polisher, turn it into the cavity with the fingers, making sure it gets home. A little lateral pressure will snap the rod where marked, and when the cement has set it can be cut down with corundum stones and polished. When the operation was completed, the color of the tooth was so perfectly matched that the inlay was hardly discernible. . . . The Phenique Chemical

Company, of St. Louis, Mo., distributed samples of campho-phenique, together with a pamphlet describing its composition, and containing instructions as to its use. This pamphlet contains a number of letters from members of the medical and dental fraternity. A description of its application in dentistry appears in an article by Dr. J. Foster Flagg in the DENTAL COSMOS for July, 1889. . . . Dr. J. W. Ivory, of Philadelphia, Pa., exhibited his improved cervix clamp and separators. A number of those in attendance who had used these instruments in their practice for some time indorsed them very highly. . . . Dr. Hubbard, of Brooklyn, showed a case of disease of the antrum in a girl aged twenty-one. Various opinions were expressed as to the cause of this trouble, but no satisfactory conclusion was reached, and it was determined to leave the matter till the next clinic. . . . A case showing a method of supplying the lower central incisors was also exhibited by Dr. E. B. White. One central remained, and owing to pyorrhea had moved to the center of the space, and was temporarily retained by a yoke attached to the laterals, but it was so loose that it was readily removed with foil-carriers. Half caps were fitted to each of the laterals, allowing the cap to extend over the lingual to the labial side of the cutting-edge of the tooth, which was beveled down from within outward at about an angle of fifty-two degrees for the purpose of locking the crown and to prevent it being pushed downward. After fitting the caps and placing them in position, an impression was taken for making a model on which to locate the dummies for soldering, by placing soft plaster in the space to be filled and allowing it to extend above the cutting-edge of the teeth, and having the patient bite into it while soft. By this means the impression and articulation were taken at once. After pouring the model, the teeth were to be fitted to place and backed, and the whole piece invested (in plaster two parts, marble-dust one part) and soldered. When removed from investment, it will be finished with engine and stump corundum wheels, and felt wheels and pumice, and then cemented in place. The attachment by means of half caps makes a strong and durable piece and avoids the devitalization of the teeth for pin-crowns, also the unsightliness of gold that would occur were the teeth full capped. Those opposed to bridge-work on the ground of uncleanliness would doubtless change their opinion should they see this piece in position. . . . Dr. L. Ashley Faught exhibited an electro-dental heater for the manipulation of gutta-percha in filling cavities. Its advantages are, a uniform heat by which the gutta-percha in the plug is kept in a plastic condition throughout the mass until the work is completed ; impossibility of overheating ; thorough control of each particle. Connected with this instrument is a cap for adjusting dowel or pivot teeth when set in gutta-percha. By substituting a fine broach,—a set of which is furnished with the instrument, —the electro-dental heater can be used for drying out pulp-canals. The instrument worked very nicely, and will prove of great assistance to the busy operator.

Dr. W. W. Walker. Mr. President, in view of the fact that the State of New York is expected to take a great part in the World's Dental Meeting which will be held in Chicago in August and the early part of September, 1893, I think it proper that we, as one of the legalized and representative societies, should take some action in recognition of the work that is now being done in preparation for that meeting. I therefore offer the following resolution :

Resolved, That the First District Dental Society of the State of New York cordially approve the plan for holding a World's Columbian Dental Meeting in Chicago, Ill., August 31 to September 10, 1893, and pledge the support and assistance of the society and its members to in every way promote the success and usefulness of the meeting.

The resolution was, on motion, adopted.

Incidents of Office Practice.

Dr. Ottolengui. I would like to state a case, with the idea of hearing the experience of the gentlemen present, and whether any remedy could be offered. A gentleman called at the office to-day, sent to Dr. Kingsley, to see if a lower denture could be made for him. For some cause he has had the lower jaw on one side from the median line, back to, and including a portion of the ramus, entirely removed. The gentleman wears a beard, and there is no evidence, externally, of the malformation. From the median line to the left there is really a very good ridge, but it is edentulous. The question is, Can he have any teeth supplied with the hope of their being useful? There is nothing on the other side to support a plate, and the end of the bone that is left moves around, so that it would interfere. It did not seem to Dr. Kingsley or to me hopeful that anything put on half of the jaw would serve him. I wondered whether it would be fair to attempt to make him a denture.

Dr. Bogue. I think a similar case was reported by Dr. Rosenthal in the Dental Cosmos some years ago.

Dr. Littig. About three months ago a young practitioner whose name I have forgotten consulted me about a case where it was desired to put in a plate to supply missing teeth on one-half of the lower jaw. I advised him to fasten the piece with clasps to the half of the jaw where the teeth remained, and to attach a spiral spring to the other side. I saw the case when completed, and it looked as though the patient could use it, but she went to Canada, and I have not heard of it since. This case, of course, is not like that described by Dr. Ottolengui.

Dr. Gottschaldt. For some time I have tried a mixture of cement that is very thin—thinner than usual—and chloro-percha in sensitive and deep cavities, and I have found it of great benefit. It is easily introduced, and will stay anywhere you put it, and it will harden in three minutes at the most without decreasing in bulk or curling up. It has proved very satisfactory in temporary teeth, and it does not seem to matter whether the tooth is perfectly dry or not; it sticks there quite well. I do not know whether this is new or not, but I hope that those who have not heard of it will give it a trial.

The President. We will now pass to the subject of the evening, and will listen to an address by W.C. Barrett, M.D., D.D.S., of Buffalo, N. Y., upon—

Comparative Dental Anatomy.

Dr. Barrett. I have chosen the subject named for two reasons. First, because of its scientific and professional importance, and second, that I might present to you the collection of skulls and dentitions which has during the day been on exhibition in the adjoining room. I believe this to be the first occasion on which such a display has been made before a dental society. I may say more. I do not believe that such an exclusively dental collection can be found elsewhere in the whole world. I have seen the museums of London, Amsterdam, Hamburg, Paris, and other cities, and there is nothing there like it, and I am sure that nothing equaling it can be found in America. Here are the principal classes and genera in all the orders of the vertebrates represented, and many are very rare indeed. In the Ungulata alone there are almost enough to form a museum. The Mammalia may be said to be almost complete in the leading species, while in Aves and Fishes there are many specimens, and all are scientifically arranged according to the dentition. I believe that the Natural Science Establishment of Professor Ward, at Rochester, in this State, from which the specimens were chiefly obtained, is unequaled. Certainly I never saw anything approaching it in the Old World.

Some catalogues of the collection, prepared by Mr. Ward, are present, and they will give you an idea of the method of classification. It has been suggested that I define some of the terms used, as they may be new to some of you.

The Mammalia, it will be seen, are divided into the Ornithodelphia, the Didelphia, and the Monodelphia. This division is founded upon the character of the uterus and the manner of birth or incubation. The first-named includes only the Ornithorhynchus and the Echidna.

The cloaca is common to the intestinal, urinary, and generative organs, like that of birds, and it is implacental.

In the Didelphia (*dis*—two, *delphys*—womb) the young are born in an incomplete state, and are received into a pouch, in which the mammæ are contained. They comprise the Marsupials of Australia, and the only other Marsupial known, the American opossum.

The Monodelphia comprise all the rest of the Mammals. As the name indicates, the uterus is single, and the young are born complete.

Mammals are divided, according to their dentition, into Monophyodonts and Diphyodonts. The first have but one set of teeth during life, while the second have a deciduous and a permanent dentition. They are also divided according to the teeth into Homodonts and Heterodonts. In the first the teeth are all alike, as in the Cetacea, Edentata, and Pisces. In Heterodonts the teeth are divided according to their forms into Incisors, Cuspids, Premolars, and Molars. Man is thus a Monodelphic-Diphyodont-Heterodont.

Having premised this much, I will proceed to the consideration of the subject of the evening.

As dentists we are fond of calling ourselves scientific men, and of making reference to scientific dentistry. I cannot but think that these terms imply a confusion of ideas. Pure science is the knowledge of principles and deductions. When this knowledge is reduced to a set of precepts, with practical skill as the basis, it becomes an art. When knowledge is made the foundation for practical results to be secured, it becomes applied science. A man may study physiology or pathology as abstract sciences, but when he makes a practical application of that knowledge in the curing of disease, he is engaged in professional work. The practice of dentistry is not, therefore, in any sense the study of science. Such practice may depend upon certain scientific knowledge, but it is not of itself science.

The difference between a profession and an art is that the former depends upon a knowledge of principles, and its practice is the application of general law, which varies with each individual case. An art is the production of mechanical effects through the following of unvarying rules or precepts. The one is ratiocination, the other is manual dexterity. The one produces its effects through a process of the intellect, the other by mechanical skill. The first employs only the brain, the other the hand. The profession originates its methods, the art copies what has before been done.

In this view of the case, we can readily conceive that the practice of the dentist, as commonly followed, has two aspects,—the one strictly professional, the other entirely mechanical. One practitioner may be in its highest sense engaged in a profession, while his neighbor is but following a trade. The one may be amenable to the code of ethics, either written or unwritten, which environs all acknowledged professions, while the other is really engaged as an artisan, and naturally views it from the mechanical point of view.

But whether a practitioner regards himself as a professional man or as an artisan,—a handicraftsman,—if he is actuated by any noble motive, by any of the laudable ambitions which fire the heart of all self-respecting men, he earnestly desires to see his avocation honored by the world, and himself with his compeers raised in public estimation by the belief that they are doing all possible to fit themselves for the beneficent service of their fellow-men. He will not degrade his calling in the eyes of the world, for by so doing he himself is dishonored. He will endeavor to convince his fellow-men that his avocation is one of usefulness, and that he is a benefactor of his race. If his patients are not benefited by his ministrations, his occupation is discredited and his personal credit diminished.

In many callings, more especially those of a professional nature, it is expected of their followers that they will have a general knowledge of the principles and laws which underlie them. Nay, more,—that they will be acquainted with the collateral sciences which affect, even remotely, their calling. The illiterate physician is at once discredited ; not that he is quite destitute of experience and judgment, but because he has not the general culture which is absolutely necessary for a fair comprehension of the laws of nature, which may only become known to the student and scholar. The theologian must be a man of erudition, else how shall he be able to comprehend the springs of human action, when he knows not the mental history of mankind?

The dentist, because at the very least he follows one of the higher arts, must for complete success in his calling be versed in the science of natural philosophy, as well as in medical lore, or he cannot comprehend the basal principles which underlie good practice.

Heretofore dentists have studied but the practical side of their avocation. Their knowledge has been confined to the organs upon which they are engaged in work. They have not looked at their calling from a scientific point of view, but have confined themselves strictly to professional labor. Nor, to my apprehension, have they always approached this from the proper side. We engage in earnest discussions concerning the genesis of dental abnormalities and irregularities, but our view is introspective altogether, when it should be retrospective, prospective, and above all, circumspective as well. If an irregularity be a divergence from an established type, how shall we determine where departure commences until we have established the type, and how shall we fix the type until we have examined it in all its manifestations?

If we desire that dentistry shall be accepted by all the world for what we, who are its exemplars, know it to be worth, we must be prepared to demonstrate its capabilities to all classes and conditions of men. If the naturalist finds us densely ignorant of general dentition, and only intent upon the money which we make by a pretence to culture, he will justly despise our affectation and scout our demands for recognition as educated men. And where shall we find a man in our ranks who has a technical knowledge of dentistry as a science?—for that would imply general and intimate information concerning the dentures of other orders and classes than man. If upon this table you see a collection of skulls, how many can tell by the dentures to what genera each belongs—nay, to which of the few orders? If a tooth be handed to each of us in turn, which can, with certainty, tell to what kind of an animal it belonged? And yet this is a knowledge for which of right we should be held accountable. It is directly in our line. We should be ashamed to call ourselves a learned body when the very rudiments of general dental science are unknown to us.

It is for the purpose of stimulating, if possible, a study to which we should be devoted, that I appear before you to-night. You have the privilege of looking upon such a collection of dentitions as, I believe, none of you ever saw before. There is brought to your attention something which no professional museum of the country can, in even a comparatively small degree, parallel. All the orders, and most of the leading classes in the Vertebrata, are represented, some of them by numerous specimens, and all these are beautifully mounted for study. Does it excite your earnest attention? In proportion to that heedful regard may the professional intelligence of New York be gauged.

I cannot be expected, within the limit of such a paper as this, to review all the kinds of teeth as represented in the different classes exhibited here. I can only, in a very general way, refer to the subject of comparative dental anatomy, and try to present a few basal facts for your brief consideration.

There is no part of the anatomy of the animal that is so generally typical of species as the teeth. It was said of Cuvier, that if he were given a tooth, he would from it reconstruct the animal in all its general characteristics. The teeth at once give an index of the food, the habits, and the general environment of all animals.

[The speaker here selected an elephant's tooth, and from its general characteristics proceeded to reconstruct an animal of which it would be an index.]

The dental organs are intended to subserve a variety of purposes. He who reasons that they were made in all instances for mastication, is very ignorant of comparative anatomy. In the Reptilia they are usually but round, sharp, needle-like points, directed backward, and their office is to serve as organs of prehension. Their victims once seized, it is impossible for them to escape. In the Carnivora the teeth are weapons of offence, the long cuspids being especially adapted for seizing and rending their prey. The teeth of some of the Rodentia are tools with which they cut and prepare material for their habitations, etc. In some of the Fishes and the Cetacea, which feed upon small organisms found in the water, the teeth are arranged in rows at the sides of the capacious mouth, those of one jaw fitting between those of the opposite, and they serve as strainers, allowing escape of the water but retaining the food. The tusks of the Walrus, and more especially of the extinct Dinotherium, are instruments for digging up their food, and those of the former are ice anchors, by which they drag themselves upon the floes. The horn of the Narwhal is an incisor tooth, and the tusks of the Elephant are modified incisors. Through all the various orders of animals there is a wide diversity in the purposes which the dental organs subserve.

As might naturally be expected, their number, form, and development differ very greatly. The Narwhal has but two teeth, and one of these is rudimentary, while in many fishes they are almost countless. In position there is a very wide diversity. In most mammals they are situated in the maxillary arch, but in some classes they may be found upon the tongue, the vomer, the palatal bones, and even in the esophagus and stomach. They are as varied in form as in number. In the Sharks they are frequently like the teeth of a saw, and those of some of this class are the precise shape of the most modern patent saw-teeth. It has been said that some of the Sharks can bite off a man's leg. An examination of the cartilaginous jaws will convince anyone that this must be a mistake. It is also affirmed that from the peculiar shape of the Shark's head he cannot seize his prey without turning upon his side. This seems to me an error also. But an examination of the teeth and jaws of the man-eating Sharks in the collection presented before you to-night will convince anyone that the teeth, which are shaped like those of a saw, must be used like those of a saw. The Shark, seizing a projecting organ of its victim and closing its jaws, turns itself over and does actually saw off what it has seized, instead of biting it off.

The incisor teeth, or tusks, of some of the extinct Proboscidæ grew to an enormous length, in some instances as much as thirteen feet. On the other hand, the teeth of the Rays and some others consist of flat, bony plates. In the Skate the jaws are covered with sharp-pointed protuberances, pointing backward. In Aves separate teeth are absent, and they are provided with mandibles,—hard, bony plates which serve the purposes of teeth. Thus we may see that the dental organs of the various orders differ widely, not only in their use, but in form, number, and position.

As a rule the lower orders of animals have teeth that are of a very simple structure, and their attachment is superficial. They are strictly ecderonic, or epidermal structures, and are but modifications of epithelial cells, like horns, nails, and hair. In the Vertebrates, on the contrary, the true teeth are enderonic, or developed, not from the epithelial layer, but from one which answers to the derma of the integument. The plates of the Lampreys, the Ornithorhynchus, the Sirenia, and the mandibles of birds, are of course epithelial structures, but they are not true teeth. This may also be said of the "baleen" of the Cetacea, the so-called whalebone.

The tissues of teeth are of course well known to all present. Through all the orders of animals it is the dentine that is characteristic of true teeth. Enamel may be present or absent. Cementum may or may not form a part of the organ. There may be a pulp, which is the remains of the papillary stage, or which may be persistent and continuous through life in its function; but if the principal portion of the structure be not dentine, with parallel and dichotomously-dividing tubuli, then is the organ not a true tooth. This tissue may be peculiar in its appearance or arrangement, but in every tooth it is unmistakable. The tusk of the elephant is composed exclusively of a specialized dentine, which is the ivory of commerce, but it is a true dentine. In some of the orders this tissue is differentiated in a widely varying manner. Among fishes alone there is hard or true dentine, osteo-dentine, vaso-dentine, plici-dentine, and dendro-dentine.

Not only does the character of the tissues vary in different orders and genera, but there is a divergence in individuals. For instance, the dentine in the African Elephant reaches its highest development for commercial purposes—and of course for physiological use—immediately under the equator, for this seems the natural habitat of the animal. The ivory obtained a few degrees either north or south of this imaginary line does not bring as much in the market as that from an animal which lived near the equator. It is not as dense or as fine. There is also a marked difference in that of different individuals. Ivory being a commercial substance, its uses have determined this point beyond dispute. Of course it is one of importance to us as dentists.

While speaking of locality and its influence upon dental development, let me instance Australia. It is well known that the flora, as well as the fauna of that continent, is peculiar. It is a singular fact that all the animals indigenous to Australia either belong to the Didelphia or have didelphic modifications. Thus there are Carnivores, and Rodents, and Ungulates, that are true Marsupials, and so far as the teeth go all the Carnivora are Marsupial Carnivora, all the Ungulata Marsupial Ungulata, and this rule holds good through all the orders represented. The dentition of the Monodelphia approaches that of the Didelphia, and the relative number of the premolars and molars is typically reversed.

The most of the Mammalia are Diphyodonts : that is, there are two sets of teeth,—the deciduous and the permanent. The deciduous or milk teeth of the Heterodonts consist of incisors, cuspids, and molars. The permanent set have also the premolars, called in the human dentition the bicuspids. The premolars are those teeth which succeed the deciduous molars. In the human dentition, as we all know, the bicuspids succeed the temporary molars, the molars of the permanent dentition having no deciduous predecessors. This rule holds good through all the various orders, and in some the premolars and their neighboring molars cannot be distinguished apart in any other way than by determining which had a predecessor in the deciduous dentition. No matter, then, what may be the size or appearance of a tooth, if it succeeds a deciduous molar it is a premolar ; if it does not, it is a true molar. The Elephant, which I have so often used as an exemplar, has a succession of molars through life, but as it has no true deciduous molars, it has no premolars, but all its back teeth are true molars. I suppose you are all aware that, as one of its molars is worn out by use, another comes forward and takes its place, though all the germs are existent at one time. This is beautifully illustrated in the bisected elephant's jaw in the collection. In all the orders the distinction between the incisors and molars, in such animals as have them thus differentiated, is by their form and location, the incisors being found in the anterior and the molars in the posterior part of the oral cavity.

The method of attachment of the teeth varies widely. In such as are of a strictly epithelial character they form, of course, a portion of that membrane, or are differentiated from but closely connected with it. In some orders there is a true anchylosis of the teeth to the bone. In the higher orders, in which the teeth are enderonic, they are usually developed from a papilla within a socket situated in the bone or alveolus, and their attachment is within that socket. The method of this attachment forms one of the most certain indications for distinguishing the character and structure of fossil animals.

I have said that the number of the teeth varies, from the single developed incisor of the male Narwhal to the countless small horny papillæ of some fishes and reptiles. In the Mammalia their number is, however, limited, and they are divided into the classes incisors, cuspids, premolars, and molars, while their succession is regular. This number varies, however, within a definite limit in the several classes, but the highest typal number is forty-eight,—twelve incisors, four cuspids, sixteen premolars, and sixteen true molars. This number is not in ordinary existence to-day, but if an archetype of the mammalian dentition exists, it is without doubt that of forty-eight teeth. That which is more common now is one of forty-four teeth; namely, twelve incisors, four cuspids, sixteen premolars, and twelve molars.

From these varying numbers of the teeth in the different orders, and from the forms of the teeth, what is called a dental formula has been arranged, with special characters or initials to indicate the several teeth and their position in the jaw. Thus, the incisors are specified by the small letter "i," the cuspids by "c," the premolars by "pm," and the molars by "m." The deciduous teeth are indicated by prefixing the letter "d." The dental formula of forty-eight teeth would then be written thus:

$$\mathrm{i}\,\frac{3-3}{3-3},\ \mathrm{c}\,\frac{1-1}{1-1},\ \mathrm{pm}\,\frac{4-4}{4-4},\ \mathrm{m}\,\frac{4-4}{4-4}=48.$$

That of the hog, with forty-four teeth, would be thus:

$$\mathrm{i}\,\frac{3-3}{3-3},\ \mathrm{c}\,\frac{1-1}{1-1},\ \mathrm{pm}\,\frac{4-4}{4-4},\ \mathrm{m}\,\frac{3-3}{3-3}=44.$$

It will be seen that four teeth have been lost in this latter dentition, and these are from the molars, the last one at each extremity of the alveolar arch in both jaws having been suppressed—if we look at the matter from a probable developmental stand-point.

The horse has forty teeth, and his formula would be written thus:

$$\mathrm{i}\,\frac{3-3}{3-3},\ \mathrm{c}\,\frac{1-1}{1-1},\ \mathrm{p}\,\frac{3-3}{3-3},\ \mathrm{m}\,\frac{3-3}{3-3}=40.$$

It must be said, however, that he has yet another premolar, which is undeveloped, it probably being in process of suppression. It will be seen that in this dentition a premolar has also been lost.

The formula of thirty-six teeth might indicate the loss of either an incisor or another premolar. It is an intermediate dentition. That of thirty-two teeth is the dentition of man, and is written thus:

$$\mathrm{i}\,\frac{2-2}{2-2},\ \mathrm{c}\,\frac{1-1}{1-1},\ \mathrm{pm}\,\frac{2-2}{2-2},\ \mathrm{m}\,\frac{3-3}{3-3}=32.$$

Here we see that, from the dentition which we have adopted as the type, sixteen teeth have been lost; namely, four incisors, eight premolars, and four molars. The principal suppression, it may be seen, is in the premolars, and this indicates a remarkable change in the deciduous dentition. In the type there were thirty-two milk-teeth, while in the primates to-day there are but twenty. The suppression would seem mainly to have taken place in the temporary teeth first.

It will be noticed that the number of the cuspids has neither increased nor diminished in these formulæ. This is true in the male mammalia, but in the female, as in Equus,—the horse,—the cuspid has, in some instances, been lost. Of course this is not the case among the carnivora or predaceous animals, but is observed only in those genera in which the teeth are merely weapons of defence.

The distinguishing characteristic of the teeth of the Carnivora is the long-pointed cuspids, or canines. These are very dense and hard, and of great strength. They are deeply implanted in the jaws, the root being considerably longer than the crown. They are conical in shape, and are curved slightly backward. Those of the lower jaw shut in front of the upper ones, when the mouth is closed. The premolars are usually the most important of the back teeth, the molars being small. Both premolars and molars are adapted to cutting and rending, rather than comminuting their food. They shut by each other like the blades of a pair of scissors. The incisors of the Carnivora are six in each jaw, and they are arranged in nearly a straight line between the large cuspids.

The teeth of the Ungulates differ very widely from those of the Carnivores. In the latter the crowns are covered with enamel. In the Herbivora the enamel and dentine, and sometimes the cementum, of the premolars and molars are mixed together in perpendicular laminæ, or striæ. The incisors are broader in proportion, and stronger, while the cuspids, when present, are less marked and not as prominent. The molars are broad and strong, and from the alternations of the enamel and dentine the wear is unequal and the grinding-surface becomes furrowed. Subsisting, as these animals do, upon a pabulum which contains comparatively little nutriment, it is necessary that it be thoroughly comminuted and ground up before it is presented to the action of the digestive fluids. The large, broad crowns of the molars, unequally worn, through the varying hardness of the alternate layers of enamel and dentine, present the most perfect organs for the thorough preparation of this food. As they mainly live upon the grasses and grains, which have a siliceous covering, the resisting powers of the teeth must be great, and even then there will be a constant and considerable wear from attrition.

In the Elephant this is provided for by a succession of molars. Although the dental formula says that these are seven in number, there is but one in full use at any time. When this is worn out it is moved forward, and is at the same time extruded and shed, and another which has been in process of development moves forward and takes its place, and is in turn itself shed when worn out.

The Ruminants, of course, have the molars of the rest of the Graminivora, but the incisors are specially modified. Those of the upper jaw are wanting, but in their place is a hard, callous pad, against which the lower sharp-edged incisors impinge. The manner of the digesting of their food demands this. The Ruminants belong to the Artiodactyla, and are not usually belligerent, depending for their safety rather upon their running abilities than upon their powers of defence. They are timorous in disposition, while their food contains so little nutriment that they demand a large quantity of it. It would be impossible for them, with their limited means of defence, to obtain sufficient pabulum if they must masticate it as it is procured. They are, in this emergency, provided with four stomachs, the first of which is but a pouch or receptacle for the cropped but unmasticated and insalivated herbage. The ruminant, then, in the early morning hours, proceeding to its feeding-grounds, wraps its long, flexible tongue about a mouthful of grass; with its lower incisors this is pressed against the incisive pad in the upper jaw, and it is torn off and swallowed, passing into the first stomach, or rumen. This is continued until a sufficiency is obtained, when it hies away to some leafy covert, where it hides itself to perfect the act of mastication and insalivation. It has the power of regurgitating this food, and after thoroughly masticating it of again swallowing it, when it passes into the true digestive tract.

The dental formula of the Ruminantia is not constant. In some of this order there are cuspid teeth, their suppression not having been complete. But such as vary in this particular are without the horns which usually distinguish the Ruminants. The Musk Deer has very prominent and pointed cuspids, but it is hornless.

There is another peculiarity in the mastication of the Ruminants. The teeth of both sides of the mouth cannot occlude at the same time, one jaw being wider than the other. If the first stroke of the lower jaw is from left to right, the succeeding ones, on that particular bolus of food, until it is finished, will be from right to left. Then a new bolus is introduced and the method reversed. This peculiar motion of the jaws, only the teeth upon one side meeting at a time, furnishes the most perfect method of grinding the food.

The Rodentia have yet another modification of the incisors. Instead of a finished growth, they continue development during life. The pulps are what is called "persistent." There is never any closure of the apex of the fang into a foramen, but there is a constant addition at the root, and a continual growth upward, the tissues of both crown and root having the same relative arrangement. The roots of these persistent teeth are so long, to give them sufficient strength, that they reach back beneath and beyond the posterior line of the last molar. This order uses these teeth for cutting wood, either to use it as a food or in building its habitations. There is such an incessant wear, that were they not to continue growing the incisors would soon be entirely gone. As the growth is regular as well as continuous, gnawing becomes a necessity for a rodent, or its incisors would be so elongated that its molars would not meet, and the animal could not close its mouth. The gnawing of the rat in the wainscoting is not always for the purpose of making new passages, or for the especial annoyance of those who would sleep, but that it may keep its teeth worn down.

If by an accident one of the incisors of a rodent is broken off or lost, the opposite one for want of an antagonist is not worn down, and cases have been known in which an incisor of a beaver has continued its growth until it has almost completed a circle, or until the animal starved. The tissues of the incisors of the rodents are peculiarly arranged, the enamel forming a thin layer upon the anterior face, while the whole posterior portion is composed of dentine which, wearing faster than the enamel, keeps them at a chisel edge.

The Cetacea are Monophyodonts and Homodonts ; there are no deciduous teeth, nor have any of them more than a single root. The number varies very widely, and there is no division into incisors and molars, all being of the same general character. In the Right Whale there are teeth in the fœtus, but they are soon lost, and what is called baleen, or whalebone plates, take their place. These are triangular in shape, and one side is frayed out into filamentous processes, making a kind of fringe, and these, when the mouth is shut, form a kind of inclosure. The animal feeds by swimming among shoals of small fish, mollusca, etc., and taking them in by the quantity the water is strained off through these filaments, leaving the food to be swallowed.

In the Dolphins and Porpoises there are a large number of teeth usually, but the Narwhal, as has been stated, has but a single developed tooth, which takes the form of an enormously elongated tusk.

The Cheiroptera have three kinds of teeth,—incisors, cuspids, and molars. The number of these varies considerably, especially in the insectivorous bats.

In the Edentata the teeth are by no means entirely lacking, as their name might denote, but when there are teeth the incisors are usually absent, or at least the median ones are entirely lacking. As they continue to grow from the papillæ they do not form roots, and they have no enamel, consisting only of dentine and cementum. There are deciduous teeth only in some of the Armadillos. In the Sloths there are usually five teeth on each side above, and four below, and as they impinge upon their sides they are worn into a chisel shape.

In the Primates, to which order man belongs, the usual dentition is that with which you are so well acquainted. The order is divided into three classes,—the Lemuridæ, the Simiidæ, and the Arthropidæ. The usual dentition will be found upon the accompanying chart.

The Simiidæ have the same number of teeth as have the Arthropidæ, but not infrequently the premolars are one more and the molars one less, which indicates a deciduous dentition of twenty-four teeth, as in the Marmosets.

In the Anthropomorphia, the animals most nearly allied to man, the dentition is very like that of man. The cuspids of the Gorilla, however, are inordinately developed, and its teeth are arranged in the form of a partial parallelogram, instead of an arch, the molars and premolars assuming that relation to each other which in the human we call the "saddle-shaped" arch, so that the latter may not be really a general abnormality, but a correlation to the development of an allied class.

Time fails me further to call attention to the dentitions of the different classes or families of the vertebrates. Let me say a very few words concerning the arrangement of the tissues. I have said that these are the ones found in man,—enamel, dentine, and cementum, with their modifications. In the Carnivora, and most predaceous animals, the enamel covers the whole crown, as in man. In the Herbivora there is a different arrangement, especially in the molars, these tissues being grouped in perpendicular laminæ, with dentine and enamel, and in many instances cementum, alternating. In some other animals the teeth are made up of denticles, which together form the compound tooth, and this peculiarity is especially found in the Cape Ant-Eater. In others there is a peculiar commingling of the tissues into separate plates, and these are especially found in some fossil forms. I show you a number of charts illustrating these peculiarities.

The density of these tissues varies in different classes of animals. In some, the teeth contain so large a proportion of organic matter that they may be bent and easily cut, while the tooth of the Hippopotamus is so hard that with a piece of flint a spark may be struck from it. This density and hardness is what made it so valuable for artificial teeth in the Archæan time of dentistry, before the advent of porcelain substitutes.

It has been supposed by many that animals are exempt from the dental diseases which afflict mankind. This is a gross mistake. I have a horse which all at once ceased to eat with his usual avidity. He would hang his head, and saliva would run from his mouth in streams. A little examination showed that he was suffering from toothache. I will exhibit to you the skull of a Cynocephalus which has but four sound teeth,—the lower incisors. I have here the skull of a Gorilla which had a very large alveolar abscess, and, what is more, an antral abscess, with alveolar necrosis, some of his teeth being decayed almost away. The cuspids especially are singularly decayed. This was an old male. It will be remembered that the Gorilla has never been kept in captivity.

Here is another, a female Gorilla, which suffered from undoubted pyorrhea, and the teeth are considerably decayed. Horses' teeth are so subject to disease that a class of horse dentists has arisen, and they practice exclusively upon the teeth of horses.

In this paper I have been able to give you little more than a few segregated facts in comparative dental anatomy. The subject is too vast for anything but the most cursory examination in a single evening, but in conclusion I wish most earnestly to call your attention to the importance of this field of dental study. Why should not each one of us take up a single class of animals, and thoroughly master all the peculiarities of their dentition? In this way we might add to the dignity of our calling by cultivation of that part of the field of general science which is peculiarly our own, and by an acquaintance with some branch of odontography be the better fitted to perform the duties of the practitioner. Let it no longer be a reproach to us that we do not know the science to which we have devoted our lives.

[During the reading of the paper, Dr. Barrett referred several times to a number of charts which had been hung around the room, and explained some of the illustrations, and also the skulls of different animals, which were exhibited on tables in front of the platform.]

And now, gentlemen, let me add this: Here is a collection which beautifully illustrates a field of science which it belongs to us to cultivate; it has been neglected in the past, and I now solemnly declare that the dentists of the city of New York will be lacking in that which they owe to their profession, to their brethren, and to those who shall come after them, if they do not secure the collection now brought before them, and which is for sale. I have not the slightest pecuniary interest in its disposal, but I have a deep scientific regard for it. I will give one hundred dollars toward its purchase. I would like it to be in New York. I want it to be where the greatest number can have access to it. But if New York does not want it, and will not secure it, I shall make a determined effort to get it in Buffalo, and I will give two hundred dollars toward that. If you let this collection, which it has taken such a long time to collect, leave you, I shall have a diminished opinion of your intelligence and enthusiasm. It ought to be everywhere, but it cannot be, and I would be glad if I could see it in the great metropolis of our country,—New York City.

Discussion.

The President. Gentlemen, you have heard this paper; I would like to have your prompt recognition of its merits in your remarks upon it. I would specially call on Professor Lyons, of New York, who is with us as a visitor.

Professor Lyons. I think it were entirely out of place for me to endeavor to add anything to the excellent lecture that has already been given. I came in at the request of some friends of Dr. Barrett, who told me that undoubtedly the lecture would be interesting to me, for Dr. Barrett would this evening prove conclusively that we were all descended in a direct line from the hog. I was especially anxious to know something of my ancestors. [Laughter.] I have been endeavoring for a long time to get something to put on my carriage appertaining to my descent, and I thought probably the solution of that question would be given to-night. But Dr. Barrett has given us something more valuable, something that, according to my estimation, is very correct, and we may say, scientific. I was especially pleased with the manner in which he distinguished science and art at the beginning of the lecture, and I have thought that it would be well to bear in mind the suggestions there made. If there were any way of controverting what he has said, I should be very happy ; but since everything he has said seems to be in the line of science, I certainly have nothing whatever to add further than this, that I have been very much benefited by the lecture.

I ought to have added, perhaps, that one other reason why I was specially interested was because I had heard of a certain demonstrator of anatomy who once had before him in his class two subjects : on one side the ordinary hog, and on the other the human subject. After having called attention for some length of time to resemblances between the two (I believe to dental men this is quite an old account), he remarked, "Now, my friends, either there is a great deal of human being about the hog, or else there is a great deal of hog about the human being ;" and I have come to the conclusion that although we have not been directly descended, yet there is that relationship, which I am glad to see Dr. Barrett seemed to remark all through his lecture. He took it for granted that the evolution theory is true, and I am certainly willing to add my testimony to it.

Dr. Bogue. Possibly I may be permitted to ask whether I understood correctly some of Dr. Barrett's remarks. Perhaps he spoke, and perhaps he did not, of the teeth of the Crustacea.

Dr. Barrett. I made no reference to the Crustacea nor to the Mollusca. They are outside the scope of the paper.

Dr. Bogue. Another thing which he alluded to was that an animal which had cuspids never had horns. He also made a third remark, which is perhaps more in this line. The saddle-shaped jaw was not, according to comparative anatomical science, abnormal, but only a reversion to an original typal form. That pleased me very much, and I therefore made a note of it for future use. Another remark—and I want to be serious for half a minute, if I can—another remark he made bears upon some work which I am trying to do, and that is, that the development of the molars of the elephant is always from behind forward—from the posterior toward the anterior part of the mouth. I propose to have something more to say about that later on, if I live, which will tend to show that not only the elephant develops his molars that way, but the human being as well; and that has a decidedly practical bearing with us in the exercise of our art. I hope, Mr. President, we shall be permitted to offer to Dr. Barrett the thanks of this society for his very able and very instructive discourse of this evening.

Vote of thanks carried unanimously.

Dr. Ottolengui. In the course of his remarks, Dr. Barrett alluded to the fact that it has been argued that the Cave Bear was associated with man, because his teeth were found with holes through them, which could only have been made by man. I do not deny that, because I do not know enough about it; but that is why I rise to ask what evidence there is which shows that the holes in these teeth must necessarily have been made by man. It is a well-known fact to those who have studied entomology that there are many insects which feed on animals after death, many of which have been found in the hard tissues, and it occurred to me as possible that the depredations may have been made by that order, rather than by man. We do not know everything about the habits of insects, and this has been recently demonstrated by the discovery of an insect which eats iron. In one of the provinces in France certain steel railroad rails were constantly giving out, apparently rusting, very rapidly, so much so that accidents happened very frequently. Finally, after repairing over and over, they were taken and examined microscopically, and there insect life in all its forms, from the egg, was discovered, and it was found that they destroyed the iron; and it occurred to me that unless there is something powerful to prove that these holes were made by man, it may have been done by nature,—and I want Dr. Barrett to tell us more about this interesting point.

Dr. Barrett. That is a question in ethnology, or rather anthropology, which does not come within the scope of the paper. I did not speak of that as the only means of connecting the troglodyte period of man with the Cave Bear. The teeth of which I spoke, when referring to the skull of the Cave Bear in this collection, were bored by instruments, and fragments of the flint, etc., are found in the periphery of the perforation. But there are also found rude drawings on some of the teeth, as well as on the horns of the reindeer of that period. They are associated, too, with fires artificially kindled, and there are unmistakable evidences that these fires were used to cook food. This is never the work of insects, any more than are the artificial carvings representing the Cave Bear, the Reindeer, and the hairy Elephant.

The railroad iron referred to was corroded by the secretions—or excretions—of the insects. It was not eaten by them. When inorganic matter is perforated by any of the Articulata, it is that they may make habitations, either for themselves or their larvæ, and they never cut a hole directly and entirely through. They only make a chamber.

May I refer to another subject which has been touched upon by one of the speakers? I did not come here to address you on general science. I was simply to speak of anatomical and pathological conditions. If I had desired to bring forward evidences of the truth of that doctrine commonly called evolution, I could have found plenty in this collection. You will note the fact that it was not I who introduced this subject, and I never said that man was descended from a hog. I know to what the allusion has reference. I have said that the hog has the typical dentition of the Ungulates of to-day. The man who speaks of evolution as teaching that man is descended from a quadrumanous ape, or that he has any nearer ethnological relation to that order than to any other, simply advertises his ignorance of what is the doctrine as taught by the greatest naturalist who ever lived. No evolutionist ever asserted that man owes his descent to any animal whatever. This looking for "the missing link" is not on the part of the evolutionists. There is no such thing.

Evolution, let me say, teaches this: "In the beginning" God created the first organic cell, and He endowed it with the power of procreating its species and of adapting itself to constantly changing environments. Almost immediately a variability commenced, through accidental modifications, as well as through those brought about by change of environment. From that one common center—the first created living thing—this change proceeded in all directions, and through the innumerable ages which have succeeded, and compared to which historic time is but as the stroke of the pendulum, this change has been continued and perpetuated. Change is the order of Nature. From the initial point the divergence in one direction resulted in, let us say, the Crustaceans, in another the Mollusks, in another the Radiata, in another the Arthropoda, in another the Rodents or the Ungulates, and in yet another, by Divine guidance, in Man; but that man was ever a monkey, or a monkey a Carnivore, or a horse, or a sheep, or a cow, or a long-tailed rat, is more absurd to me than it is to you, who may be the most intense advocate of a separate creation for every order, genera, species, family, variety, or individual.

Prof. Lyons. I simply wish to say that I concur entirely in the remarks made by Dr. Barrett, and he understands fully that they were his own friends who made those remarks, and it was merely for the joke of the thing, not from a scientific point of view.

Dr. Barrett. Professor Lyons will understand that I am aware that he knows what is and what is not true evolutionary doctrine, but I do not like to make a jest of a grave scientific discussion, which should be characterized by earnestness. It has been said that it is a wise child that knows its own father. That man is yet wiser who knows who are his friends.

Dr. Ottolengui. While the enthusiasm evoked by Dr. Barrett's lecture is still on us, would it not be a good idea to appoint a committee to look into this matter, to see how this collection can be retained in New York City? I would suggest that a fund be raised by assessment or subscription, or entirely by voluntary subscription; or, failing in this, we could invoke the aid of other societies in New York and Brooklyn, and get the matter in shape, so as to act upon it in some manner. If the collection were in New York, I am satisfied that it would grow very rapidly. I myself would add to it in a small way. Within a year I have had a collection of over one hundred fossil teeth, comprising forty varieties, which I let go to a naturalist, because I had not the space for it. I am in a position where I could obtain fossil teeth, and donate them. All I have retained is a magnificent specimen, in perfect preservation, of an elephant's tooth. If I am not out of order, I would move that the chair appoint a committee of three or five to look into the matter of getting this collection for New York City.

Motion carried.*

Adjourned. B. C. Nash, D.D.S., *Secretary.*

Catalogue of skulls arranged according to the dentition, exhibited by Dr. W. C. Barrett at the February meeting of the First District Dental Society; purchased by dentists of New York City, and now exhibited in the rooms of the Society. Selected and arranged at Ward's Natural Science Establishment, Rochester, N. Y.

SYSTEMATIC SERIES.

MAMMALIA.

ORNITHODELPHIA. MONOTREMATA.

(*No calcified teeth. Two horny plates on each side of each jaw.*)

Ornithorhynchus anatinus	The Duck-billed Platypus

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*At the close of the discussion it was announced that by voluntary contributions the sum necessary for the purchase of the collection had, with little effort, been secured, and that the magnificent specimens of the dentition of different animals, from the fifteen-foot jaws of a sperm whale to the almost microscopical teeth of some Cheiroptera, was the property of New York dentists, and would at once be placed in position for study and observation.

DIDELPHIA. MARSUPIALIA.

(*Typical formula* $i\,\frac{3}{3}$, $c\,\frac{1}{1}$, $p\,\frac{3}{3}$, $m\,\frac{4}{4} = 44$. *The order of Marsupialia are peculiar in having but one* (*when any*) *deciduous tooth on each side of each jaw. Dentition diphyodont and heterodont.*)

Didelphys virginianus	Opossum
Dasyurus ursinus	Tasmanian Devil
Thylacinus cynocephalus	Tiger Wolf
Phascolarctos cinereus	Koala
Macropus rufus	Kangaroo
Halmaturus thetidis	"
Phalangista vulpina	Phalanger
Phascolomys ursinus	Wombat

MONODELPHIA. EDENTATA.

(*Monophyodont homodont dentition. Teeth of persistent growth.*)

Cholœpus hoffmanni	Sloth
Tatusia peba	Texan Armadillo
Chætophractus villosus	Armadillo
Euphractus minutus	"
Tolypeutes conurus	"
Myrmecophaga jubata	Ant-eater
Glyptodon (*cast of fossil*).	

MONODELPHIA. CETACEA.

(*Monophyodont homodont dentition.*)

Physeter macrocephalus (*jaws*)	Sperm Whale
Beluga catodon	White Whale
Delphinus delphis	Dolphin
Balæna cisarctica (*section of short baleen plates*)	Right Whale
Zeuglodon teeth (*cast*).	
Cetacean tooth (*from phosphate beds, South Carolina*).	

MONODELPHIA. SIRENIA.

(*Monophyodont heterodont dentition.*)

Halicore australis	Dugong

MONODELPHIA. UNGULATA.

(*Diphyodont heterodont dentition.*)

PERISSODACTYLE UNGULATES.

Equus caballus	Horse
Rhinoceros indicus	Rhinoceros
Tapirus terristris	Tapir

ARTIODACTYLE UNGULATES.

(*Non-ruminant.*)

Dicotyles torquatus	Peccary
Phacochœrus æliani	Haruja
Hippopotamus amphibius	Hippopotamus

(*Ruminants.*)

Cervulus aureus, male and female	Muntjac
Cervus canadensis	Elk
Alces malchis	Moose
Bison americanus	Buffalo
Ovis aries	Sheep
Capra hircus	Goat
Llama pacos	Llama
Camelus arabicus	Camel

EXTINCT UNGULATES.

Oreodon (*fossil skull and cast*).
Anoplotherium (*cast*).

TOXODONTIA.

Toxodon (*fossil, cast of skull*).

MONODELPHIA. PROBOSCIDEA.

(*Diphyodont heterodont dentition.*)

Elephas indicus	Elephant

(*Jaw bisected to show succession of teeth from behind, and the detached plates of dentine.*)

Mastodon giganteus (*molar and section of tusk*).
Elephas primigenius (*molar*).
Dinotherium (*cast of fossil jaw*).

MONODELPHIA. HYRACOIDEA.

(*Diphyodont heterodont dentition.*)

Hyrax capensis	Hyrax

(*Dentition resembles both the Rhinoceros* [*in pattern of its molars*] *and the Rodents.*)

MONODELPHIA. RODENTIA.

(*Diphyodont heterodont dentition.*)

Arctomys monax	Woodchuck
Fiber zibethicus	Muskrat
Castor canadensis	Beaver
Hystrix cristata	Porcupine
Cercolabes prehensilis	Tree Porcupine
Hydrochœrus capybara	Capybara
Cœlogenys paca	Paca
Dasyprocta variegata	Agouti
Capromys piloroides	Coypu
Lepus callotis	Rabbit

Castoroides ohioensis (*cast*).

MONODELPHIA. CHEIROPTERA.

(*Diphyodont heterodont dentition.*)

Pteropus melanopogon (*Frugivorous*)	Fruit Bat
Rhinolophus (*Insectivorous*)	Bat

MONODELPHIA. INSECTIVORA.

(*Diphyodont heterodont dentition.*)

Centetes ecaudatus	Tenrec
Condylura cristata	Mole

MONODELPHIA. CARNIVORA.

(*Diphyodont heterodont dentition.*)

TERRESTRIAL CARNIVORA.

CYNOIDEA.

Vulpes fulvus	Fox
Cynogale bennetti.	
Canis dingo	Dingo

ŒLUROIDEA.

Felis leo	Lion
Felis concolor	Puma
Felis planiceps	Jungle Cat
Lynx canadensis	Lynx
Paradoxurus stygmaticus.	
Crocuta maculata	Hyæna
Proteles lelandi	Aard Wolf
Machairodus (*fossil cast*).	
Hyæna eximia (*fossil jaw, cast*).	

ARCTOIDEA.

Meles taxus	Badger
Mustela canadensis	Fisher
Ursus maritimus	Polar Bear
Ursus horribilis	Grizzly Bear
Ursus spelæus	Cave Bear
Procyon lotor	Raccoon
Nasua rufa	Coati

AQUATIC CARNIVORA.

OTARIDÆ.

Otaria jubata	Sea Bear
Zalophus californicus	Sea Lion
Calorhinus ursinus	Fur Seal

PHOCIDÆ.

Phoca groenlandica	Harp Seal
Stenorhynchus leptonyx	Sea Leopard
Halichœrus gryphus	Gray Seal

TRICHECHIDÆ.

Odobænus obesus	Walrus

MONODELPHIA. PRIMATES.

(*Diphyodont heterodont dentition.*)

Homo—New Zealander.

SIMIIDÆ.

(*Anthropoid Apes.*)

Gorilla savagei, male and female (*Showing sexual development of the cuspids.*)	Gorilla
Troglodytes niger	Chimpanzee
Simia satyrus	Orang
Hylobates syndactylus	Siamang

CERCOPITHECIDÆ.

(*Old-World Monkeys.*)

Nasalis larvatus	Nose Monkey
Semnopithecus jubatus.	
Colobus bicolor.	
Macacus rhesus	Rhesus
Cynocephalus porcarius	Baboon
Mesophithecus (*fossil cast*).	

CEBIDÆ.

(*New-World Monkeys.*)

Mycetes seniculus	Howler
Hapale jaccus	Marmoset

LEMURIDÆ.

Lemur varia	Ruffed Lemur

AVES.

Vesperornis regalis (*fossil, cast of jaw*), Kansas.

REPTILIA AND BATRACHIA.

Python molurus	Python
Crotalus	Rattlesnake
Crocodilus vulgaris	Crocodile
Alligator lucius	Alligator
Dicynodon lacerticeps (*fossil cast*).	
Thalassochelys caouna	Loggerhead Turtle
Hatteria punctata	Tuatara
Placodus gigas (*cast of fossil skull*).	
Rana mugiens	Frog

PISCES.

ELASMOBRANCHII.

(*Sharks and Rays.*)

Selachus maximus	Basking Shark
Cestracion phillipsi	Pt. Jackson Shark
Lamna cornubica	Porbeagle
Raja	Skate
Pristis antiquorum (*Saw*)	Saw Fish
Carcharodon megalodon (*fossil teeth, cast*).	

GANOIDEI.

Lepidosteus osseus	Gar Pike

TELEOSTEI.

Anarrhichas lupus	Wolf Fish
Lophius piscatorius	Angler
Gadus morrhua	Cod
Lucioperca americana	Pike
Pseudoscarus oviceps.	
Acrodus anningiæ (*fossil cast of lower jaw*).	

A SERIES OF SECTIONS OF JAWS AND TEETH.

Elephant, Sperm Whale, etc., showing the implantation and structure.

A SERIES OF YOUNG SKULLS, showing milk dentition of various kinds.

BRITISH COLUMBIA DENTAL SOCIETY.

PURSUANT to call, a convention of the dentists of British Columbia was held in Victoria, February 16, 1891, for the purpose of organizing a provincial dental society.

There were present fourteen dentists out of a total of seventeen in the province, and the proceedings were harmoniously conducted, resulting in the formation of the British Columbia Dental Society. A constitution and by-laws were adopted, and the following officers were elected for the ensuing year: T. J. Jones, D.D.S., Victoria, president; C. H. Gatewood, D.D.S., Vancouver, first vice-president; A. J. Holmes, D.D.S., New Westminster, second vice-president; Dr. A. C. West, Victoria, secretary-treasurer; and an executive committee composed of W. R. Spencer, D.D.S., of Vancouver, and W. J. Quinlan, D.D.S., and R. F. Verinder, M.D., D.D.S., of Victoria.

The object of the society is to establish and promote a friendly feeling among the fraternity, mutual improvement, and to generally advance the status of the profession in the province. Yearly conventions will be held, the next meeting to take place in Vancouver on July 17 of this year.

A. C. WEST, *Secretary*, Victoria, B.C.

THE STOMATOLOGICAL CLUB.

THE Stomatological Club, of Buffalo, N. Y., is a society composed of dentists and physicians, organized for the purpose of studying the pathology of the oral cavity, comparative dental anatomy, and such kindred scientific subjects. Its regulations provide that while professional questions and matters of practice shall not be entirely excluded, their consideration shall not be the main object for meeting, but shall be held subordinate. During the past winter the time has been principally devoted to the study of oral bacteriology.

The club is an affiliated body of the Buffalo Academy of Natural

Sciences, its meetings being held in the Academy's building, and the collections of that society being used as objects of study and illustration. The membership is not confined to the city of Buffalo, nor to the dental profession. Its officers are as follows: W. C. Barrett, president; A. P. Southwick, vice-president; H. A. Birdsall, secretary-treasurer; M. B. Straight, curator; S. Eschelman, J. Edward Line, and F. W. Low, advisory council.

H. A. Birdsall, M.D., *Secretary*,
No. 680 Main street, Buffalo, N. Y.

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

A meeting of the Central Dental Association of Northern New Jersey was held at Newark, N. J., February 16, 1891.

The following officers were elected for the ensuing year: C. F. W. Holbrook, president; H. Iredell, vice-president; S. S. Hawley, secretary; Chas. A. Meeker, treasurer; George E. Adams, R. M. Sanger, S. C. G. Watkins, W. L. Fish, and B. F. Luckey, executive committee.

S. S. Hawley, *Secretary*,
Corner Warren and Thirteenth streets, Newark, N. J.

HARVARD ODONTOLOGICAL SOCIETY.

The thirteenth anniversary of the Harvard Odontological Society was celebrated at Young's Hotel, Boston, Mass., February 28, 1891; the president, Dr. William P. Cooke, of Boston, in the chair.

Among the guests of the evening were Harold C. Ernst, M.D., Thomas H. Chandler, D.M.D., Charles A. Brackett, D.M.D., Rev. Albert H. Plumb, D.D., and Rev. George A. Crawford, D.D.

The annual address was delivered by Dr. Henry L. Upham, of Boston, his subject being "Pleasures and Pains," which he discussed from a philosophical, scientific, and professional stand-point.

The following officers were elected for the ensuing year: Jere. E. Stanton, M.D., D.M.D., Boston, president; Waldo E. Boardman, D.M.D., Boston, recording secretary; Charles H. Taft, D.M.D., Cambridge, corresponding secretary; Dwight M. Clapp, D.M.D., Boston, treasurer. Executive Committee: Waldo E. Boardman, D.M.D., Herbert M. Clifford, D.M.D., W. E. Page, D.M.D., all of Boston. Editor: Henry L. Upham, D.M.D., Boston.

Dr. H. W. Gillett, of Newport, R. I., was chosen to deliver the address at the next annual meeting.

Charles H. Taft, *Corresponding Secretary*,
Cambridge, Mass.

ALUMNI ASSOCIATION, NEW YORK COLLEGE OF DENTISTRY.

THE Alumni Association of the New York College of Dentistry has elected the following officers for 1891: J. Howard Reed, president; John I. Hart, first vice-president; J. W. Taylor, second vice-president; Vincent M. Munier, secretary; Zachary T. Sailer, treasurer. Executive Committee: Sherman B. Price, chairman; H. J. Parker, and E. S. Robinson. College Committee: F. A. Chicherio, chairman; George A. Hull, Edmund D. Frost, Arthur L. Swift, and J. J. Strohmeyer.

VINCENT M. MUNIER, *Secretary*,
No. 102 West Ninety-fifth street, New York, N. Y.

SOUTHERN DENTAL ASSOCIATION.

THE twenty-third annual meeting of the Southern Dental Association will be held at Morehead City, N. C., commencing August 11, 1891. The officers of the association and chairmen of the various standing committees are as follows:

Dr. G. F. S. Wright, Georgetown, S. C., president.

Dr. R. K. Luckie, Holly Springs, Miss., first vice-president.

Dr. W. H. Richards, Knoxville, Tenn., second vice-president.

Dr. Louis P. Dotterer, Charleston, S. C., third vice-president.

Dr. M. C. Marshall, Little Rock, Ark., recording secretary.

Dr. D. R. Stubblefield, Nashville, Tenn., corresponding secretary.

Dr. H. E. Beach, Clarksville, Tenn., treasurer.

Dr. H. J. McKellops, St. Louis, Mo., chairman executive committee.

Dr. V. E. Turner, Raleigh, N. C., chairman committee of arrangements.

Dr. E. L. Hunter, Enfield, N. C., chairman committee on operative dentistry.

Dr. J. H. Crawford, Raleigh, N. C., chairman committee on prosthetic dentistry.

Dr. Morgan Adams, Sardis, Miss., chairman committee on dental education.

Dr. E. S. Chisholm, Tuscaloosa, Ala., chairman committee on dental hygiene.

Dr. W. A. Gingrich, Norfolk, Va., chairman committee on pathology and therapeutics.

Dr. W. C. Wardlaw, Augusta, Ga., chairman committee on histology and microscopy.

Dr. A. P. Johnston, Anderson, S. C., chairman committee on chemistry.

Dr. John C. Storey, Dallas, Texas, chairman committee on literature and voluntary essays.

Dr. M. C. Marshall, Little Rock, Ark., chairman committee on publication.

Dr. J. Rollo Knapp, New Orleans, La., chairman committee on appliances and improvements.

Dr. W. H. Richards, Knoxville, Tenn., chairman committee on dental Chautauqua.

Dr. Gordon White, Nashville, Tenn., master of the clinics.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

THE forty-second session of the American Medical Association will be held in Washington, D. C., on Tuesday, Wednesday, Thursday, and Friday, May 5 to 8, 1891, commencing on Tuesday at 11 o'clock A.M.

Following is a list of the essayists (with subjects) who have promised to prepare papers for the Section of Oral and Dental Surgery:

1. Address of the chairman of Section, Dr. Eugene S. Talbot.
2. "Adenoid Growths," Dr. W. H. Atkinson.
3. "Treatment of Fractures of the Maxillæ," Dr. Wm. Carr.
4. "Genesis of Contour Fillings," illustrated, Dr. Geo. S. Allan.
5. "The Teeth of Invertebrate Animals," Dr. A. H. Thompson.
6. "A Study in Comparative Dental Anatomy," Dr. Wm. H. Potter.
7. "Rheumatic and Gouty Diathesis as manifested in Diseases of the Peridental Membrane," Dr. John S. Marshall.
8. "Dental Infirmary Patients—The Use and Abuse of Dental Charity," Dr. Richard Grady.
9. "Growth of the Cementum," Dr. R. R. Andrews.
10. "Remarks on Incipient Necrosis and Caries," Dr. J. L. Williams.
11. "Choice of Therapeutic Filling-Materials," Dr. W. W. Allport.
12. Dr. J. Taft. (Subject not announced.)
13. "Thorough Dentistry *vs.* Partial Dental Surgery," Dr. J. Y Crawford.
14. Dr. Thomas Fillebrown. (Subject not announced.)

Other members who desire to read papers before this Section should, as required by the by-laws, forward the paper, or its *title* and *length*, to the chairman, Dr. Eugene S. Talbot, No. 125 State street, Chicago, Ill., one month before the meeting.

HENRY W. MORGAN, *Secretary*, Nashville, Tenn.

AMERICAN DENTAL ASSOCIATION.

THE executive committee have decided on Saratoga Springs as the next place of meeting of the American Dental Association, commencing first Tuesday in August, 1891.

It is hoped by the committee that each society will send delegates, that we may have a full representation from all parts of the country.

Programme and arrangements to be announced later.

J. N. CROUSE, *Chairman Executive Committee*,
No. 2231 Prairie avenue, Chicago, Ill.

GEORGIA STATE DENTAL SOCIETY.

THE twenty-third annual meeting of the Georgia State Dental Society will be held at St. Simon's Island, Ga., May 19 to 23, 1891.

L. D. CARPENTER, *Cor. Secretary*, Atlanta, Ga.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

ANY dentist desiring a copy of the minutes of the last meeting of the National Association of Dental Faculties, or those wanting additional copies to those already sent, can have them by sending a card to the undersigned.

J. D. PATTERSON, *Secretary*,
Keith and Perry Building, Kansas City, Mo.

ILLINOIS STATE DENTAL SOCIETY.

THE twenty-seventh annual meeting of the Illinois State Dental Society will be held at Bloomington, beginning Tuesday, May 12, 1891, the sessions continuing four days.

GARRETT NEWKIRK, *Secretary*,
No. 34 Monroe street, Chicago, Ill.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE next annual meeting of the New York State Dental Society will be held at Albany, N. Y., May 13 and 14, 1891.

It is expected that this will be the most interesting meeting held in years. Subjects of vast importance to the dental profession will be presented. Head-quarters, Delevan House ; reduced rates.

W. W. WALKER, *President*.
F. T. VAN WOERT, *Secretary*,
No. 152 Noble street, Brooklyn, N. Y.

SOUTHERN MINNESOTA DENTAL SOCIETY.

THE annual meeting of the Southern Minnesota Dental Society will be held at Mankato, Minn., April 21, 22, and 23, 1891.

E. L. HAWES, *Secretary*, Mankato, Minn.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

A MEETING of the Alumni Association of the Philadelphia Dental College will be held at the Colonnade Hotel, Fifteenth and Chestnut streets, Philadelphia, Pa., on Thursday, April 9, 1891, at 8 P.M.

Those expecting to attend will please advise the secretary, Dr. Alonzo Boice, No. 1612 Vine street, Philadelphia, Pa.

DENTAL COLLEGE COMMENCEMENTS.

OHIO COLLEGE OF DENTAL SURGERY.

THE forty-fifth annual commencement exercises of the Ohio College of Dental Surgery (Department of Dentistry of the University of Cincinnati) were held at the Scottish Rite Cathedral, Cincinnati, Ohio, on Wednesday, March 11, 1891, at 8 o'clock P.M.

The valedictory was delivered by Professor J. S. Cassidy, M.D., D.D.S., and the class oration by H. Stewart Gilson, D.D.S.

The number of matriculates for the session was two hundred and ten.

The degree of D.D.S. was conferred on the following graduates by D. W. Clancey, M.D., D.D.S., vice-president of the board of trustees:

NAME.	STATE.
Emanuel J. Abeles	Ohio.
Benjamin E. Ashby	Kentucky.
Travers Barrett	Missouri.
Andrew H. Boyd	Tennessee.
William A. Burnett	Ohio.
John W. Buzzerd	Ohio.
Chas. H. Campbell	Ohio.
Clinton E. Case	Indiana.
Jerome B. Chaffee	Missouri.
Frank R. Chapman	Ohio.
John M. Chase	Ohio.
Mrs. Fannie Cooper	Kentucky.
Harlan B. Copsey	California.
Donald D. Cornell	Iowa.
Ben B. Cory	California.
Will. McA. Coryell	Indiana.
E. P. Cunningham, Jr.	Ohio.
Hugh C. Davidson	Ohio.
G. W. DeCamp, Jr.	Ohio.
Will H. Ervin	Indiana.
Frank E. Favret	Ohio.
J. Carpenter Foulk	Ohio.
Thos. W. Freeman	Canada.
Leander B. Furman	Pennsylvania.
Charles H. Geiger	Ohio.
Joseph W. Gercken	Ohio.
Harry S. Gilson	Pennsylvania.
Edward C. Grant	Ohio.
John H. Hines	Ohio.
Allen Howe	Minnesota.
Charles W. Hubbell	Ohio.
Elmer E. Israel	Indiana.
James W. Jackson	Ohio.
Harry J. Johnson	Ohio.
Lester H. Knapp	New York.
Albert A. Kumler	Ohio.
Clayton V. Lanum	Ohio.
William S. Leeds	Indiana.
William S. Locke	Ohio.
J. F. Lockhart, M.D.	Kentucky.
Lewis A. Long	Pennsylvania.
Cornelius V. Mallory	Ohio.
John W. McAbee	California.
Frank M. McCarty	Indiana.
W. Owen McGaughy	Mississippi.
Edward A. Mehaffey	Texas.
Edwin C. Meyer	Indiana.
George M. Miller	Canada.
Joseph V. Miller	Wisconsin.
Elmer C. Moore	Ohio.
William N. Morgan	Ohio.
John F. Outcalt	Ohio.
Clark S. Pearce	Illinois.
Frank A. Pfouts	Ohio.
Joseph R. Price	Massachusetts.
William J. Reid	Ohio.
Charley D. Richey	Pennsylvania.
Robert P. Scudder	Ohio.
Geo. M. Shafer, M.D.	Ohio.
Charles L. Slutter	Ohio.
Harold E. Smith	Ohio.
Stephen C. Smith	Indiana.
A. Cristie Smysor	Ohio.
William D. Snyder	Ohio.
Frank McG. Sparks	Indiana.
John A. B. Srofe	Ohio.
Edw. R. Stevenson	Ohio.
William W. Tarr	Ohio.
Benjamin C. Taylor	Ohio.
Herman B. Van Tress	Ohio.
Henry E. Weick	Ohio.
Albert Weiler	Ohio.
John F. Werner, Jr.	Michigan.
Charles S. Williams	Ohio.
Eugene F. Winchet	Ohio.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE thirty-fifth annual commencement exercises of the Pennsylvania College of Dental Surgery were held at the Academy of Music, Philadelphia, Pa., on Friday evening, February 27, 1891, at 8 o'clock.

The annual address was delivered by Professor C. N. Peirce, D.D.S., dean.

The number of matriculates for the session was two hundred and fifty-one.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hayes, M.D., president of the college :

NAME.	STATE OR COUNTRY.
Wm. Alexander	Pennsylvania.
E. W. Armistead	Virginia.
Chauncey Bachman	New York.
N. J. Baker	New York.
H. P. Baldwin	New Hampshire.
Roberto Barrera	U. S. Colombia.
T. W. Bortree, M.D.,	Pennsylvania.
Richard Y. Bates	Minnesota.
L. B. Bowie	Pennsylvania.
Chas. G. Bowles	Michigan.
Wm. P. Brown	Minnesota.
Chas. M. Brooks	New York.
J. A. Brunet	Chili.
Melquiades Bruges	U. S. Colombia.
J. P. Calvert	Pennsylvania.
George Campusano	Pennsylvania.
C. W. Chapman	California.
Cunningham Clark	Pennsylvania.
Edw. Conover	New Jersey.
Sam. M. Cooley	Indiana.
A. G. Courtney	New York.
A. E. Cribbs	Pennsylvania.
Z. H. Curry	Pennsylvania.
T. J. Crymes	South Carolina.
C. T. Dahlin	Illinois.
H. H. Donaldson	Pennsylvania.
Geo. W. Dunbar, Jr.	New York.
C. B. Edmiston	Pennsylvania.
Max J. Fischel	Pennsylvania.
S. W. Frazier	Ohio.
J. W. Fulstone	Nevada.
G. L. Grier	Delaware.
M. E. Grossman	Honolulu, H. I.
G. W. Gunther	Germany.
E. T. Grosvenor	Michigan.
J. G. St. Hammond	Sweden.
W. J. Hardie, L. D.S.	Scotland.
W. G. Hays	Pennsylvania.
J. J. Heffernan	Pennsylvania.
L. W. Heinlein	Ohio.
Geo. H. Heist	Virginia.
H. M. Hertig	Pennsylvania.
Winfield M. Hubler	Pennsylvania.
Morgan L. Hulme	Pennsylvania.
E. L. Irving	Minnesota.
F. W. Ivory	Canada.
G. R. Johnson	Canada.
H. S. Keepers	Pennsylvania.
W. S. Kelly	Pennsylvania.
E. S. Kirkpatrick	Pennsylvania.
Chas. G. Koester	New York.
Louis F. Koehler	Pennsylvania.
Ricardo Larenas	Chili.
H. W. Leightner	Pennsylvania.
A. M. Lewis	Minnesota.
Wm. E. Linn	Ohio.
B. M. Loar	Pennsylvania.
F. A. Lackner	Canada.
Wm. J. Longnecker	New York.
Mateo Lucena	Venezuela.
Felice Maddalena	Italy.
A. P. Matson	Connecticut.
A. B. Miller	Pennsylvania.
Morton Mills	New Jersey.
Fred. Miltenberger	Germany.
C. O. Morris	Pennsylvania.
E. C. Musser	Pennsylvania.
S. J. MacMains	Pennsylvania.
Ellen MacMurray	Pennsylvania.
H. McIntyre	Canada.
A. L. Parker	New Hampshire.
V. A. Pazmino	U. S. Colombia.
Henry A. Phillips	England.
E. E. Phipps	Pennsylvania.
Wm. C. Porter	England.
Joaquin Prieto	U. S. Colombia.
C. G. Richardson	Pennsylvania.
F. W. Rice, M.D	Pennsylvania.
Louis S. Robensohn, M.D.,	Russia.
Emetrio Serrano	U. S. Colombia.
Jules Simond	Switzerland.
Geo. N. Slater	Pennsylvania.
C. P. Shoemaker	Pennsylvania.
F. W. Steinbock	Pennsylvania.
H. J. Stewart	New York.
T. B. Stewart	Pennsylvania.
Ellwood Tate	Pennsylvania.
W. K. Thorp	Pennsylvania.
C. L. True	New Hampshire.
Chas. S. Voorhis	Pennsylvania.
S. D. Weber	Pennsylvania.
W. R. Wilkinson	Canada.
Emily W. Wyith, M.D.,	Pennsylvania.
Emma C. Wygant	New York.

PHILADELPHIA DENTAL COLLEGE.

THE twenty-eighth annual commencement exercises of the Philadelphia Dental College were held at the Academy of Music, Philadelphia, Pa., on Thursday, February 26, 1891, at 8 P.M.

The address to the graduates was delivered by Professor J. Foster Flagg, D.D.S., and the valedictory by Charles L. Ziegler, D.D.S.

The number of matriculates for the session was three hundred and fifteen.

The degree of D.D.S. was conferred on the following graduates by Charles P. Turner, M.D., secretary :

NAME.	STATE OR COUNTRY.
Joseph B. Aaron	New York.
Thomas H. Agnew	Canada.
Edmund H. Albee	New Hampshire.
H. Augustus Aldred	Pennsylvania.
George J. Andler	Massachusetts.
Cuthbert C. Archer	West Indies.
Albert R. Baker	Canada.
Edward C. Barrrett	Maine.
Louis L. Beach	Connecticut.
Fred. L. Black	New Brunswick.
J. E. Blanchard, Jr.	Louisiana.
Frank E. Booth	Kentucky.
William H. Booth	Pennsylvania.
William M. Bolger	Pennsylvania.
Charles S. Bragdon	Maine.
Clark W. Brown	Pennsylvania.
Oscar W. Burdats	West Virginia.
John G. Buss, L.D.S.	France.
Wm. S. Caldwell, Jr.	Pennsylvania.
Wm. L. Callaway	Missouri.
C. G. Capwell	Rhode Island.
Thomas D. Carman	New York.
Ed. Caspersonn	Australia.
E. R. Chatham	New York.
Arthur L. Chase	Maine.
B. O. Chapman	New York.
S. W. Chapman	Connecticut.
Julius Cohn	Roumania.
William S. Cook	Pennsylvania.
A. Olin Comins	Connecticut.
Martha C. Corkhill	Pennsylvania.
Elmer Crawford	Pennsylvania.
William A. Damon	Connecticut.
Reuben S. Davey	New York.
Arthur de Garis	New York.
W. R. de Les Derniers	Canada.
N. P. Dennis, M.D.	California.
Alexander Dienst	Missouri.
G. A. Dungan	California.
Geo. F. Eisenbrand	Minnesota.
Jacob S. Elder	Pennsylvania.
J. T. Elliott	Kentucky.
William S. Engel	Pennsylvania.
William L. Fickes	Ohio.
H. M. Fry	Pennsylvania.
Charles Fyffe, Jr.	Australia.
Wm. H. Gelston	New Jersey.
James L. Graves	Oregon.
Monroe Griswold	Connecticut.
W. Edward Halsey	New York.
Wm. T. Halstead	Australia.
Joseph T. Hambley	New Jersey.
Wm. A. Hastings	New York.
Charles T. Havice	Pennsylvania.
Harry W. Haynes	Maine.
Geo. A. Henderson	Pennsylvania.
Harold C. Hewish	Canada.
Ambrose L. Hill	New York.
Arthur G. A. Hinder	Australia.
H. L. Hodgkins	Maine.
C. W. Hoopes	Pennsylvania.
Carl F. Hohl	Indiana.
D. Elmer Hunter	Canada.
Masatsune Ichinoi	Japan.
J. Holmes Jackson	Canada.
William D. Jessop	Pennsylvania.
David W. Johnston	New Jersey.
Peter Justus	Portugal.
Joseph Kalbfus	Pennsylvania.
Donald E. Kerr	Canada.
Jesse D. King	Missouri.
Thomas J. King	Maine.
Walter W. Lewin	England.
William D. Lewis	New York.
C. R. Lindstrom	Sweden.
Howard Lofland	Delaware.
William C. Logan	Oregon.
Irving H. Losee	New York.
D. A. MacMullen	California.
Nixon Maley	Canada.
Emile A. Martin	South America.
Benjamin B. Martin	Pennsylvania.
George Maschke	Ohio.
P. M. B. McCullough	Pennsylvania.
Will McDowell	Indiana.
John McHugh, Jr.	New York.
Charles S. McNeille	New York.
Frank P. Miller	New York.
Kazuyos Nakamura	Japan.
Sigmund Nadel	Austria.
Ralph A. Neel	Pennsylvania.
Geo. Q. Nickerson	Maine.
Isaac O. Noling	Illinois.
Henry B. Nones	Pennsylvania.
John W. O'Brien	New York.
Fred. H. Parker	Nova Scotia.

NAME.	STATE OR COUNTRY.
Fenimore Parkhurst	New York.
Winston G. Percival	Pennsylvania.
Walter I. Pratt	Utah.
N. E. Preston	Massachusetts.
Burt Pressey	New Jersey.
E. G. Quattlebaum, A. B.	South Carolina.
Richard N. Randles	Canada.
David P. Reid	New York.
Frank O. Rhoads	Missouri.
E. L. Richardson	Maine.
John W. Robb	Canada.
Fred. A. Roberts	New Brunswick.
John L. Robson	Pennsylvania.
C. Harry Roe	Pennsylvania.
Frederick W. Root	Massachusetts.
James M. Ryan	Massachusetts.
Wesley W. Shirlow	Australia.
Eugene A. Shillinger	New York.
Walter R. Slegel	Pennsylvania.
Clarence U. Smith	New York.
William C. Snider	New York.
Robt. M. Solomons	South Carolina.
Geo. M. Spangler	Pennsylvania.
William A. Sprout	Pennsylvania.
J. A. Stackhouse	Canada.
Carl P. Stamm	Pennsylvania.
Nathan P. Stark	Pennsylvania.
N. D. Steele	Canada.
Henry E. Stockton	North Carolina.
Joseph C. Sullivan	Alabama.
John Sweeney	Pennsylvania.
Friedrich W. Taube	Germany.
Robt. W. Tener	West Virginia.
B. R. Thistlewood	Illinois.
Jenkyn Thomas, Jr	Utah.
Henry H. Tompkins	New York.
Frank A. Traver	Wisconsin.
W J. F. VanAllen	Canada.
Leo Velescŭ	Roumania.
Ralph B. Waite	New York.
Frank W. Warner	New York.
Claude E. Wells	Missouri.
John I. Wells	Missouri.
Gilman A. Wheeler	Vermont.
Frank E. Whitcomb	Maine.
M. P. Winterfield	New York.
William E. Wright	Delaware.
William L. Yocum	Pennsylvania.
R. E. Zellers	Texas.
Charles L. Ziegler	California.

SOUTHERN MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE fourth annual commencement exercises of the Dental Department of the Southern Medical College were held at Concordia Hall, Atlanta, Ga., on Saturday evening, February 28, 1891.

The valedictory was delivered by W. E. Speir, D.D.S., and the annual address by Mr. Hamilton Douglas.

The number of matriculates for the session was one hundred and five.

The degree of D.D.S. was conferred on the following graduates by Dr. T. S. Powell, president of the board of trustees:

NAME.	STATE.
E. G. E. Anderson, A. B.	Tennessee.
H. J. Arnold	Georgia.
F. L. Adams	Alabama.
J. K. Blasingame	Georgia.
S. J. Bivings	South Carolina.
W. O. Breedlove	Alabama.
W. E. Beacham	Georgia.
J. B. Bearden, M.D.	Georgia.
E. W. Clark	Georgia.
G. W. Carreker	Georgia.
J. B. Dorsett	Georgia.
B. C. Duncan	Alabama.
E. G. Griffin	Georgia.
L. D. Gale	Georgia.
T. L. Greene	Alabama.
E. L. Hanes	Georgia.
T. P. Hinman	Georgia.
D. H. Harris	Georgia.
I. S. Harn	Georgia.
N. S. Lea	South Carolina.
D. S. Lightcap	Alabama.
D. R. Lide	Georgia.
W. A. Lane	Alabama.
H. W. Lubben	Texas.
R. S. McArthur	Georgia.
J. H. Merritt	Georgia.
J. B. Moncrief	Georgia.
F. J. Pulford	Louisiana.
W. R. Pearson	Georgia.
J. A. Reed	Georgia.
J. H. Rush	Mississippi.
W. E. Speir	Georgia.
C. L. Toole	Georgia.
W. J. Wade	Georgia.
J. M. Wilkes, M.D.	Georgia.
H. R. Williams	Georgia.
J. W. Wade	New York.
J. E. Woodward	Georgia.

UNIVERSITY OF MARYLAND—DENTAL DEPARTMENT.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held at the Academy of Music, Baltimore, Md., on Wednesday, March 18, 1891.

The mandamus was read by the dean, Ferdinand J. S. Gorgas, M.D., D.D.S.; the address to the graduates was delivered by Rev. J. J. G. Webster, D.D., and the class oration by William H. Conner, D.D.S.

The number of matriculates for the session was one hundred and sixty-three.

The degree of D.D.S. was conferred on the following graduates by the dean, Dr. Gorgas, in the absence from illness of Hon. S. Teackle Wallis, LL.D., provost of the university:

NAME.	STATE OR COUNTRY.
Harry W. Allwine	Nebraska.
J. Perrin Anderson	South Carolina.
H. C. Bagby, M.D.	California.
Denison H. Baldwin	Virginia.
Frederick A. Barr	Montana.
James G. Benjamin	Montana.
Capers W. Blalock	Florida.
John D. Booth	Canada.
J. W. Boozer, A.B.	South Carolina.
Aubrey R. Bowles	Virginia.
Emory M. Bowlus	Maryland.
Charles S. Boyette	North Carolina.
Elvie S. Boyle	Maryland.
S. S. Brotherton	Iowa.
George L. Bruce	Maryland.
F. W. Chessrown	Pennsylvania.
M. H. P. Clark	North Carolina.
Wm. H. Conner	New Jersey.
G. L. Deichmann	Maryland.
William Earle	South Carolina.
Will H. Ewald	Virginia.
Wm. M. Feild	Virginia.
Herbert F. Gorgas	Maryland.
J. William Grove	Pennsylvania.
W. Oakley Haines	Maryland.
Jake V. Haller	Virginia.
Henry F. Harris	Virginia.
Marion Y. Hart	Virginia.
Will W. Hayes	Pennsylvania.
J. Henry Hoffman	Maryland.
Charles W. Howard	New Hampshire.
Edward T. Jones	Virginia.
John C. Loeschcke	Germany.
E. A. Martin, L.D.S	Canada.
Oscar Matt	New York.
Virgil J. McComb	Missouri.
C. M. McKelvey	Pennsylvania
T. Benton Moore	Pennsylvania.
F. A. Pattinson	New York.
William B. Poist	District Columbia.
Wm. E. Prather	North Carolina.
Bernard F. Riedel	Maryland.
Richie W. Riley	South Carolina.
Johannes Rilke	Germany
F. Robinson, L.D S	England.
Geo. B. Rounds	Canada.
H. Sengebusch	Germany.
Henry D. Snow	Maryland.
E. A. Solomons	South Carolina.
Alfred E. Sparks	Canada.
A. H. Sprinkel	Virginia.
C. C. Sprinkel	Virginia.
F. Myron St. John	Connecticut.
F. P. Stehley	West Virginia.
J. F. Stevens	Pennsylvania
G. W. Stevenson	New York.
R. E. L. Taliaferro	Virginia.
C. A. Turner	Canada.
A. W. A. Volck	Germany.
Albert S. Wells	North Carolina.
George F. White	New York.
R. J. Whitfield	Canada.
C. E. Wingo, M.D	Maryland.
Charles R. Wood	New Hampshire.

NEW YORK COLLEGE OF DENTISTRY.

THE twenty-fifth annual commencement exercises of the New York College of Dentistry were held at Chickering Hall, New York, N.Y., on Tuesday evening, March 10, 1891.

The valedictory was delivered by Clarence Delbert Gilson, D.D.S., of the graduating class, and the address to the graduates by Rev. Henry Y. Satterlee, D.D.S.

The number of matriculates for the session was two hundred and eighty-two.

The degree of D.D.S. was conferred on the following graduates by Hon. J. Hampden Robb, president of the board of trustees :

NAME.	STATE OR COUNTRY.
Frank L. Adair	New Jersey.
Gustav H. Adler	Saxony.
Otto H. Abbanesius	New Jersey.
Olver H. Aldred	New York.
Charles E. Allen	New York.
Bruno E. Amyot	New York.
Alfred A. Argilagos	Cuba.
David C. Baker	New Jersey.
George F. Barrett	Connecticut.
Charles G. Bassett	New York.
John Biava	France.
Bernard B. Bromberg	Austria.
John G. Broughton	New Jersey.
Mark H. Brown	Massachusetts.
Steward F. Bullis	New York.
Fred. L. Burgess	New York.
David W. Byrne	New York.
Joseph M. Bird	Porto Rico.
Thos. N. Bradfield, Jr.	New Jersey.
Charles M. Cannon	Utah.
Joseph E. Chauvet	New York.
Walter H. Clayton	New York.
Edward T. Cleveland	Canada
Frederick G. Collett	England.
James L. Dickson	Vermont.
Wm. H. Douglas, M.D.	New York.
Samuel J. Downs	New York.
Charles H. Emerson	New York.
Frank A. Fielding	New York.
Alfred C. Fones	Connecticut.
William O. Garside	Alabama.
Clarence D. Gilson	Canada.
Henry W. Graves	New York.
Henry W. Guilshan	Massachusetts.
John T. Hanks	New Jersey.
F. T. A. Hannemann, M.D.,	Germany.
James W. Hardy	New Jersey.
Morris P. Hart	Kansas.
Louis Hess	New York.
William A. Hornung	New Jersey.
William S. Hough	New York.
Benjamin Jacobson	England.
Albert R. Kadelbach	Germany.
James F. Knapp	New York.
George W. Knight	New York.
Charles B. Leverich	New York.
Frank G. Lockwood	New York.
Charles M. Luckey	New Jersey.
Fred. W. Ludlum	New York.
Samuel G. McCormick	Canada.
Frederick McNerny	Connecticut.
John B. Meeker	New York.
Robert E. Merwin	New York.
Fred. Messerschmitt	New York.
Waldo H. Minor	Connecticut.
Frank L. Morhard	Switzerland.
Frank Morris	New Jersey.
Alexander H. Moss	Russia.
Channing A. Newhall	Connecticut.
Henry S. Nichols	Connecticut.
Samuel J. L. Norton	New York.
Raul Ochoa	Venezuela.
William R. O'Neill	New York.
Mordecai H. Overton	New York.
William B. Park	New York.
Winthrop B. Payne	New York.
Andrew J. Perry	Vermont.
Henry P. Pfeiffer	New Jersey.
Frank L. Phillips	New York.
Irving H. Pomeroy	Massachusetts.
William D. Pravost	New York.
Louis E. Potter	Vermont.
Joseph S. Quinlan	New York.
George N. Reeves	New Jersey.
Walter D. Rice	New Jersey.
Thomas H. Roche, B.S.	New York.
Charles W. Root	New York.
John C. Root	New York.
Samuel P. Russell	Maryland
John F. Snedaker	Utah.
August G. Stuki	New York.
Walter F. Van Gieson	New York.
Louis E. Vernon	New York.
Francis Weinlandt	New York.
John F. Willis	New York.

MISSOURI DENTAL COLLEGE.

THE twenty-fifth annual commencement exercises of the Missouri Dental College were held in connection with those of the St. Louis Medical College, at Memorial Hall, St. Louis, Mo., on Thursday, March 12, 1891.

The address to the class was delivered by Professor George Homan, and the prizes presented by Dr. Wm. N. Morrison.

The number of matriculates for the session was ninety.

The degree of D.D.S. was conferred on the following graduates by Dr. H. H. Mudd, dean of the faculty:

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Edward L. Beatie	Missouri.	Reuben G. Porter	Michigan.
Arthur C. Bedford	Missouri.	Arthur G. Purdy	Illinois.
Moses C. Boswell	Missouri.	Wm. T. Rutledge	Missouri.
C. L. Brudewold, M.D.	Pennsylvania.	Herman Saxenmeyer	Illinois.
James S. Coyle		Herman O. Settelon	Switzerland.
Marvin L. Cumming	Illinois.	Samuel Schrantz	Missouri.
Charles E. Dungan	Illinois.	Carl E. Schumacher	Westphalia.
Walter R. Eckle	Missouri.	George C. Schwarz	Illinois.
James B. Harrison	Indiana.	John O. H. Thiele	Germany.
George D. Kennedy	Colorado.	Hugh G. Voorhies	Illinois.
John W. Markwell	Indiana.	James F. Wallace	Missouri.
John E. Masterson	Texas.	Matthew D. Wilson	Missouri.
Joseph De G. Peak	Kansas.	Park H. Winans	Illinois.

INDIANA DENTAL COLLEGE.

The twelfth annual commencement exercises of the Indiana Dental College were held in the Propylæum Building, Indianapolis, Ind., February 27, 1891.

The annual address was delivered by Dr. M. F. Ault, of Kokomo.

The number of matriculates for the session was ninety-six.

The degree of D.D.S. was conferred on the following graduates by Seneca B. Brown, M.D., D.D.S., president of the college:

A. L. Austin.
W. E. Armstrong.
W. S. Beazley.
J. W. Brimacombe.
M. M. Cook.
B. D. Curtis.
C. P. Danks.
C. Feigel.
E. D. Foulds.
C. B. Hayford.
H. C. Heaton.
C. G. Hoover.
J. B. Jacques.
W. A. Johnson.
M. W. Johnston.
G. C. Keel.
M. J. Keightly.
O. A. Keiser.
R. H. Kiser.
J. M. Lewis.
L. Lichtenwater.
Miss L. B. McCollum.
A. O. McCutcheon.
O. F. Overstreet.
O. Palmer.
B. T. Perkins.
M. Raschig.
G. S. Rhea.
L. W. Roe.
P. A. Row.
Mrs. H. G. Scott.
E. F. Shields.
O. V. Simmerman.
F. Smith.
M. Smith.
L. J. Stiver.
C. P. Tinkham.
C. E. Whitesides.
C. F. Williams.
H. M. Zehrung.

UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

THE ninth annual commencement exercises of the Dental Department of the State University of Iowa were held at the Opera House, Iowa City, Iowa, on Monday, March 9, 1891, at 8 P.M.

The annual address was delivered by William Stevens Perry, D.D., LL.D., Bishop of Iowa.

The number of matriculates for the session was one hundred and sixty-one.

The degree of D.D.S. was conferred on the following graduates by Charles A. Schaeffer, Ph.D., president of the university:

NAME.	STATE.
R. C. Amrine	Illinois.
J. O. Applebee, A.M.	Iowa.
H. O. Allen	Iowa.
C. F. Adams	Iowa.
D. C. Brett	Iowa.
G. H. Barker	Massachusetts.
G. H. Belding	Iowa.
E. Bumgardner	Kansas.
J. W. Billings	Iowa.
A. L. Brown	Iowa.
D. J. Brown	Iowa.
Frank Ball	Nebraska.
N. Burdick	Iowa.
C. D. Bemiss	Washington.
Frank Bickel	Illinois.
R. S. Bandy	Iowa.
W. J. Coughlan	Iowa.
A. L. Currie	Iowa.
George Cogley	Iowa.
V. K. Chandler	Iowa.
G. E. Chambers	Wisconsin.
W. C. Davis	Iowa.
J. W. Downey, M.D.	Iowa.
S. G. Dowdey	Iowa.
J. B. Ellis	Iowa.
W. E. Fish	Iowa.
C. A. Fuller	New York.
L. L. Foote	Minnesota.
L. S. Forbes	Iowa.
Thomas Gormley	Iowa.
C. L. Girls	Iowa.
James Galway	Wisconsin.
J. E. Hawthorne	Illinois.
L. C. Hall	Iowa.
P. R. James	Iowa.
C. O. Jerrell	Iowa.
L. E. Kaltenbach	Wisconsin.
C. E. Laird	Iowa.
J. F. Leigh	Iowa.
Cora G. Little	Iowa.
W. D. McErlain	Iowa.
James McNeil	Iowa.
W. W. Moorhead	Illinois.
G. C. Money	Iowa.
J. B. Moats	Illinois.
C. A. Marshall	Nebraska.
A. E. Osborn, B.S.	Iowa.
J. L. Riggs	Iowa.
J. M. Raugh	Iowa.
S. B. Reque	Minnesota.
M. A. Robinson	Iowa.
W. F. Ryburn	Illinois.
H. C. Reeves	New York.
C. C. Smith	Illinois.
L. F. Steuerwald	S. Dakota.
M. L. Spencer	Iowa.
W. C. Schoemaker	Iowa.
J. P. Von Lackum	Iowa.

MEHARRY DENTAL DEPARTMENT, CENTRAL TENNESSEE COLLEGE.

The fifth annual commencement exercises of the Meharry Dental Department of Central Tennessee College were held, in connection with those of the medical and pharmaceutical departments, at Masonic Theater, Nashville, Tenn., on Thursday, February 19, 1891.

The salutatory address was made by A. O. Lockhart, and addresses were also delivered by Dr. N. G. Tucker, Senator Early, and others.

The number of matriculates for the session in the dental class was five.

The degree of D.D.S. was conferred by Dr. J. Braden, president of the faculty, on G. W. Bunn, of Arkansas.

VANDERBILT UNIVERSITY—DEPARTMENT OF DENTISTRY.

The twelfth annual commencement of the Department of Dentistry of Vanderbilt University occurred on the evening of the 25th of March, 1891, in the chapel of the university, Nashville, Tenn.

The oration on the part of the class was delivered by C. C. Delhommer, of Louisiana, and the charge to the class by the dean, Professor W. H. Morgan.

The number of students registered the past session was one hundred and thirty-five.

The degree of D.D.S. was conferred on the following graduates by Vice-Chancellor W. F. Fillett, D.D.:

NAME.	STATE OR COUNTRY.
Robert L. Allen	Alabama.
John D. Adair	Alabama.
Archie Boales	Kentucky.
Robert H. Burks	Kentucky.
Dave Combs	Texas.
Wm. Chapman	Illinois.
Arthur Corbin	Michigan.
James E. Combs	California.
Jerre G. Cutliff	Georgia.
William W. Corley	Alabama.
Burnett S. Davis	Mississippi.
Benj. N. DuPree	Alabama.
James A. Dale	Indiana.
Charles O. Delhommer	Louisiana.
Robert D. Griffis	Texas.
Manuel Garfias	Mexico.
James M. Graham	Tennessee.
Guy H. Hudson	Alabama.
James H. Hatcher	Missouri.
Oliver P. Hope	Missouri.
Leonard T. Hallums	Tennessee.
Earnest F. Hickman	Tennessee.
Numa R. Holcomb	North Carolina.
Hamet Jordan	Virginia.
John D. Killian	Mississippi.
Roger I. Mills	Kentucky.
Stonewall J. Martin	Kentucky.
Eugene F. Morris	Texas.
John W. Perkins	Alabama.
Gideon S. Pearcy	Tennessee.
William S. Parker	Mississippi.
C. W. Patterson	Mississippi.
Rivers A. Rush	Mississippi.
James D. Smith	Tennessee.
James D. Stephens	Alabama.
Walter E. Swind	Missouri.
Weldon L. Smith	New York.
Benj. F. Storne	South Carolina.
Thomas Towles	Kentucky.
James W. Thomas	Kentucky.
John S. Ward	Tennessee.
Joseph P. Williams	Georgia.
George J. Williams	Texas.

KANSAS CITY DENTAL COLLEGE.

THE ninth annual commencement exercises of the Kansas City Dental College were held in Grand Avenue M. E. Church, Kansas City, Mo., on Tuesday evening, March 10, 1891.

The faculty address was delivered by Professor W. T. Stark, and an address was also delivered by W. S. Cowherd.

The number of matriculates for the session was one hundred and seven.

The degree of D.D.S. was conferred on the following graduates by C. B. Hewitt, D.D.S., president of the faculty:

NAME.	STATE.
Wallar B. Austin	Missouri.
William K. Aitken	Kansas.
Alba L. Ashby	Kansas.
Henry E. Baxter	Kentucky.
W. C. K. Buchanan	Missouri.
William P. Baker	Kansas.
Frederic G. Corey	Kansas.
Alonzo T. Crow	Kansas.
Frank J. Claypool	Kansas.
Archie M. Detrick	Nebraska.
Charles A. Draper	Missouri.
Rezin T. Fowler	Missouri.
Robert P. Greenlee	Missouri.
Elbert Q. Gibson	Missouri.
James Galloway	Colorado.
Harry D. Hines	Iowa.
F. G. Hunsicker	Kansas.
William B. Hale	Missouri.
Aaron L. Hitchens	Kansas.
John D. V. Kice	Missouri.
Augustine H. Kirby	Kansas.
James T. Kenney	Missouri.
Frank C. Kenney	Missouri.
Samuel W. Kincaid	Kansas.
Paul J. Laws	Kansas.
Charles B. Lyon	Kansas.
George L. Lewis	Kansas.
Alfred H. Mann	Kansas.
William B. Myers	Kansas.
James R. McLeland	Kansas.
Wm. H. Ockerman	Missouri.
Simpson Ockerman	Iowa.
Arthur D. Park	Missouri.
Chester B. Reed	Kansas.
Harry E. Roberts	Illinois.
Albert O. Sage	Kansas.
Matt. F. Toler	Kansas.
Winslow P. Upton	Kansas
Henry A. Whitmer	Missouri.
William N. West	Kansas.
George H. Woods	Kansas.
Frank M. Wilson	Iowa.
Oakley R. Wibking	Kansas.

GERMAN-AMERICAN DENTAL COLLEGE.

THE annual commencement exercises of the German-American Dental College (Deutsch-Amerikanische Schule für Zahnheilkunde) were held in the Grand Palace Hotel Banquet Hall, Chicago, Ill., on Wednesday, March 11, 1891, at 8 P.M.

The address for the faculty was delivered by Professor Dr. Fritz Brunhoff, who was also the recipient of an honorary degree. The valedictory was delivered by Dr. Felix Arendt, of Russia.

The number of matriculates for the session was twenty two.

Degrees were conferred on the following graduates by Dr. J. Bernauer, professor of histology and surgery :

NAME.	COUNTRY.	NAME.	COUNTRY.
Felix Arendt	Russia	Eugen Mueller	Switzerland.
Max Benedikt	Austria.	Edwin Schenk	Germany.
P. Krause	Germany.	C. Schuhmann	Germany.
Max Kalbe	Germany.	C. Schmidt	Germany.
E. Klemich	Germany.	August Vogele	Germany.
M. Muehlhäuser	Germany.		

COLUMBIAN UNIVERSITY—DENTAL DEPARTMENT.

THE fourth annual commencement exercises of the Dental Department of the Columbian University were held, in connection with those of the medical department, at Lincoln Music Hall, Washington, D. C., on Thursday, March 19, 1891, at 8 P.M.

The address to the dental graduates was delivered by R. B. Donaldson, D.D.S., and a valedictory address by Edmund Bavry, M.D.

The number of matriculates for the session was nineteen.

The degree of D.D.S. was conferred on the following graduates by President J. C. Walling, LL.D.: Jonathan R. Hagan, of Virginia, and Benjamin F. Odell, D.D.S., of Illinois.

TENNESSEE MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE second annual commencement exercises of the Department of Dentistry of the Tennessee Medical College were held at Staub's Theater, Knoxville, Tenn., on the evening of March 19, 1891.

An address was delivered by Rev. R. R. Sutherland, D.D., and the charge to the graduating class was given by Professor Charles M. Drake.

The number of matriculates for the session was eighteen.

The degree of D.D.S. was conferred on the following graduates by Colonel E. J. Sanford, president of the board of trustees :

NAME.	STATE.	NAME.	STATE.
R. S. Booth	North Carolina.	J. K. Moose	North Carolina.
D. D. Foley	Kentucky.	T. B. McBride	Pennsylvania.
H. F. Henderson	Virginia.	Wexler Smathers	North Carolina.
J. A. Keener	Tennessee.		

EDITORIAL.

THE ANNUAL OVERFLOW.

A FEW years since a professor in one of the leading medical institutions of the country, and the editor of a medical journal, discussed editorially the conditions under which the annual accession to the ranks of medical practitioners took place. He characterized this accession as "a yearly outpouring of semi-educated men dubbed doctors because of a belief that if the parties applied to did not confer medical knighthood upon them a rival organization would." This yearly outpouring of semi-educated men furnished in the estimation of the writer referred to the "leaven that is leavening the whole lump," and supplied the reasons for the declension of physicians in public esteem. He claimed that the deficiencies of the medical educational system were generally recognized and generally admitted; that the student was not required to prepare himself thoroughly before he was granted the diploma; in other words, that the standard of graduation was disgracefully low.

While recognizing that since the writing of the article referred to the standard of graduation in many, perhaps most, of the medical institutions of the country has been notably advanced, we believe there is not only a general recognition of the necessity for a still broader culture, but a steady purpose and effort on the part of the leading schools to bring about this result.

What was true then of the medical colleges was doubtless to a considerable extent true of the dental colleges. We contended then, however, as we contend now, that the average dental graduate is better prepared for his special practice than the average medical graduate is for general practice. But if this claim were substantiated, the inference would not thereby be justified that the average dental graduate of to-day is as well qualified as he should be for the highest service to the community.

The writer referred to has elsewhere said that the American medical profession comprises an enormous number of partially educated men, and rightfully adjudges that the struggle on the one hand to obtain the right to practice at the lowest outlay in money, time, and labor, and the rivalry of the schools on the other hand, are the chief factors in this annual output of partially educated graduates.

Whether or not these remarks apply with as much force and justice to the dental colleges, there can be no doubt that they do apply as forcibly and as justly to a large number of the applicants for the dental degree whose desire and effort is to obtain the coveted diploma with as small an outlay of time and money as possible. The unparalleled attendance—over thirty-one hundred—at the various colleges of the country for the sessions of 1890–91 has its explanation in the fact that after the present year a three-years' course will be required as essential to graduation.

It is to be feared that due discrimination has not always been made in the preliminary examination as to education and character, and as well that the final examinations have not in all cases been as rigid as they should have been.

One thing may be accepted as a fact, that "partially educated men," either in medicine or dentistry, will speedily recognize their own deficiencies, which will also be more or less promptly recognized by those whom they attempt to serve. They will also of necessity compare or contrast their competency or incompetency, and that of their class, with that of the graduates of other institutions, and credit or discredit, as the case may be, will attach to colleges in proportion as they have supplied the men best equipped for the practice of their chosen calling. Institutions, like men, have reputations to make and to sustain, and it is but a narrow-track policy which aims rather at material results than at that enduring fame which can be secured only as a reflection from the character and qualifications of their graduates.

THE AMERICAN PATENT CENTENNIAL.

SETTING aside for the time being the ethics of the patent system, it is fitting at least to make note of the fact that a celebration of the beginning of the second century of that system in America will take place at Washington, D. C., April 8, 9, and 10, 1891. It will be a noted gathering of inventors and manufacturers of patented inventions. It will be participated in by officials and men of high standing from all parts of the country.

The objects of this convention are, among others, to organize a national association for the mutual benefit of inventors and manufacturers; to secure a proper recognition of the rights of inventors; to operate to secure the perfection of the patent system; improvement in the practice of granting patents; increasing the protection afforded inventors and the owners of patents; removing existing obstacles in the way of a more thorough administration of the Patent Bureau; obtaining a more thorough knowledge of and improving the great advantages already derived from the patent system by all the varied industries of the country.

It has come to be a feature of American life to celebrate the centennial anniversaries of important national events, to take bearings as to their significance, and to inquire into the reason for their being. George Washington signed the first American patent act April 10,

1791. Whether for evil or for good, there can be no question that our patent system has had a potent influence in shaping the life of the nation during a century of marvelous development and progress.

THE COLLEGE COMMENCEMENTS.

We accord the required space for publication of the reports of the college commencements so far as they had been held at the time of going to press. These reports, although occupying considerable space, are of interest to large numbers of our readers, and are constantly referred to for information as to the school, date of graduation, etc., of the individuals, and the number of matriculates and graduates of the respective institutions. For these reasons we deem the space devoted to such reports well occupied.

DEFERRED PAPERS.

Owing to illness in the family of Dr. Black, the paper in continuation of his discussion of the management of enamel margins could not be completed in time for this issue.

The concluding paper by Dr. Miller on the anatomy and pathology of the tusks of the elephant has also failed to reach us.

BIBLIOGRAPHICAL.

A Dictionary of Dental Science, and such Words and Phrases of the Collateral Sciences as pertain to the Art and Practice of Dentistry. By Chapin A. Harris, M.D., D.D.S., late Professor of the Principles of Dental Surgery in the Baltimore College, etc. Fifth edition, carefully revised and enlarged, by Ferdinand J. S. Gorgas, M.D., D.D.S., author of "Dental Medicine," etc. Large octavo, pp. 640. Philadelphia: P. Blakiston, Son & Co., 1891. Price, cloth, $5.00; leather, raised bands, $6.00.

The author in his preface claims that the object in preparing this edition has been to make it a more purely dental work than ever before, and that he has endeavored to accomplish this by the addition of many hundred words and definitions applicable to the study and practice of dentistry, as well as by the omission of many words and phrases which do not pertain to dentistry. The volume is undoubtedly an improvement upon its predecessor, especially in the brief but comprehensive descriptions of new materials, medicaments, operations, and appliances which have been brought to the notice of the dental profession since the publication of the previous edition. There have been retained, however, many words and definitions in medicine, chemistry, botany, etc., not necessary in a dental dictionary. There are as well some notable omissions,—as, for instance, the omission of "approximal," so generally accepted as indicating the surface of a tooth nearest or next to. We find also under nitrite of amyl, "see amyl nitris," but find instead, "amyl nitrate," with a description of the physical properties and medical uses of the nitrite, which differs both chemically and therapeutically from the nitrate, which is not used as a medicine. So under the term "pyorrhea alveolaris" we are referred to "alveolar pyorrhea," but a reference to the latter term finds it conspicuous by its absence. These instances will suffice to show a want of due care, which is also manifested in numerous other cases.

Apart from such inaccuracies and omissions, the volume gives evidence of an effort to make it as comprehensive and thorough as is consistent with the author's announced purpose, and it cannot but prove convenient and useful in a dental library.

PRINCIPLES OF SURGERY. By N. SENN, M.D., Ph.D., Milwaukee, Wis., Professor Principles of Surgery and Surgical Pathology in the Rush Medical College, Chicago, etc. Illustrated with 109 wood engravings. Large octavo, pp. 602 and index. Philadelphia and London: F. A. Davis, 1890. Price, cloth, $4.50; sheep, $5.50, net.

As indicated by the title, this volume differs from the conventional treatises on surgery which have for their object the teaching of the practical details of surgical procedures; this being devoted rather to a discussion of the fundamental principles of the science and art of surgery,—the causation, pathology, diagnosis, prognosis, and treatment of the diseases classed as surgical, connecting the modern science of bacteriology with the etiology and pathology of such affections. The author has aimed to show the direct etiological relationship which exists between certain pathogenic micro-organisms and definite pathological processes. Large space is therefore given to a philosophical consideration of regeneration, inflammation, necrosis, suppuration, septicemia, pyemia, and tuberculosis. Special attention is devoted to that class of diseases which are recognized as of microbic origin, such as erysipelas, tetanus, hydrophobia, anthrax, glanders, surgical tuberculosis, and actinomycosis. As more and more it is recognized that the successful practice of medicine and surgery, or any specialty thereof, depends upon a thorough knowledge of the principles upon which it is based, so more and more will such books as this become indispensable to the student and practitioner. We heartily commend this volume to all who are ambitious to acquire a thorough knowledge of basal principles in the healing art.

DISEASES OF THE DIGESTIVE ORGANS in Infancy and Childhood, with chapters on the Investigation of Disease, the Diet and General Management of Children, and Massage in Pædiatrics. By LOUIS STARR, M.D., late Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania, etc. Second edition, illustrated. Large 12mo, pp. 382 and index. Philadelphia: P. Blakiston, Son & Co., 1891. Price, cloth, $2.50.

The first edition of this book was favorably noticed in the DENTAL COSMOS at the time of its appearance in 1886. The author has rearranged the original text, and added considerable new material,—notably a chapter on second dentition and its influence on the health in late childhood,—a subject which, as he rightly says, has been heretofore greatly neglected. The preliminary topics of feeding, bathing, clothing, sleep, and exercise are intelligently and tersely discussed, presenting conclusions that have evidently been reached as the result of much practical work and observation. The treatment recommended in the various disorders of the digestive system in infancy and childhood is discriminative and conservative. We most heartily commend this volume to all who are interested in the preservation or restoration of the health of children.

HEREDITY, HEALTH, AND PERSONAL BEAUTY. By JOHN V. SHOEMAKER, A.M., M.D., Professor of Materia Medica, Pharmacology, Therapeutics, etc., in the Medico-Chirurgical College of Philadelphia, etc. Octavo, pp. 422. Philadelphia and London: F. A. Davis, 1890. Price, cloth, $2.50; half morocco, $3.50, net.

It is a little difficult to determine whether the author of this volume aimed in its production to supply or to create a public want; whether it is intended chiefly for the scientific or the non-scientific reader. Unquestionably, however, he has contributed valuable popular instruction, and as well presented points which cannot but prove interesting to professional men, although it may be said in passing that it will probably prove to be too professional for laymen and not professional enough for the scientist.

In thirty-seven chapters the author discusses life, growth, health, the skin, the face, the hands, the feet, the nails, the hair, the teeth, the eye, the ear; food, clothing, and ventilation, and sundry other topics, including "Man's Spiritual Place in Nature," and "The Nose in its Physical, Moral, and Intellectual Aspects." Appended is a chapter on household remedies. We have here a sufficient range of subjects to give opportunity to almost any author for the utterance of many remarks wise and otherwise.

OBITUARY.

DR. ADOLF PETERMANN.

DIED, at Karlsruhe, Germany, February 5, 1891, of Bright's disease, ADOLF PETERMANN, D.D.S., in the forty-first year of his age.

Dr. Petermann was born at Frankfurt-am-Main, Germany, August 28, 1850. He was educated at the High School at Offenbach, after which he came to America and matriculated at the Philadelphia Dental College, from which institution he graduated in the class of 1869. In the same year he passed an examination before the state board of examiners in Germany.

Dr. Petermann commenced the practice of dentistry in Frankfurt, and was not long in establishing himself as a prominent practitioner in that city and its vicinity. He was appointed dentist to the courts of the Duke of Nassau (now Grand Duke of Luxembourg), the Landgrave of Hesse, and the Prince of Hohenzollern.

Ambitious for the social and educational elevation of his chosen profession, Dr. Petermann soon established a considerable reputation as a writer and editor, and among other productions that bear his name may be mentioned the "Zahnärztlicher Almanach," a statistical work having special reference to the interests of German and American graduates practicing in Germany. He was also among the first to call attention to the granting of degrees *in absentia* by the notorious Buchanan institution in Philadelphia.

Dr. Petermann was secretary to the Zahnärztlicher Verein zu Frankfurt-am-Main, and a member of many German and foreign scientific societies. In his death the career of a man of high standing is cut short. He was a sturdy champion of all that pertained to the welfare of his profession.

DR. D. FRANK WHITTEN.

DIED, at Phœnix, Arizona, March 8, 1891, of chronic pneumonia, D. FRANK WHITTEN, D.M.D., in the forty-eighth year of his age.

Dr. Whitten was born at Wolfboro', N. H., September 12, 1843. He studied dentistry, and entered practice in 1875 at South Boston, Mass. He was a graduate of the Dental Department of Harvard University, class of 1878, aud later instructor in operative dentistry in that institution. Being a skillful dentist and possessed of genial manners, he had established a large and lucrative practice. He went to Arizona last fall in search of health.

Dr. Whitten was president of the Harvard Alumni Association, one of the founders and president of the Harvard Odontological Society, one of the executive committee of the Massachusetts Dental Society, and also a member of the American Academy of Dental Science and of the American Dental Association.

In 1864 Dr. Whitten was married to Katharine H. Tuttle, who, with one daughter, survives him.

DR. C. R. COFFIN.

It is with sincere regret that we announce the death, on the 29th of December last, of Dr. C. R. COFFIN, of Kensington, at the comparatively early age of sixty-five. Dr. Coffin was born and educated in the United States. He studied his profession at Boston, and obtained his qualification at Baltimore College in 1853. In 1855 he came to this country, where he has practiced ever since, for a few years in Manchester and since then in London. Dr. Coffin's health had been failing for some time, and his friends had long ceased to entertain any hopes of his ultimate recovery. He had not taken any active part in practice since 1885.—*Journal of the British Dental Association.*

PERISCOPE.

THE HISTOLOGICAL DIFFERENCE BETWEEN BONE AND THE ENAMEL.—Among the one hundred thousand living species of animals and a like number of plants, not one of this vast multitude has ever been known to produce a structure unlike its kind.

No seed of corn has ever yielded oats ; no turnip a potato ; no pine an apple ; the egg of a hen never hatched a turtle or a frog. Throughout Nature like begets like, and this inexorable law holds good in minute cells and their products as well as in complex organisms. The physical germ we may see and study, but the spirital hand which guides the germ we cannot discover, though we may trace its expressed action upon material things.

We may watch microscopically the changes produced by the vital power in living matter, and, although we have not yet discovered the power which directs the cells of tissue in the embryo pursuing their various selective courses, yet a study of the progressive changes of contour, arrangement, and position manifest in development must ever be interesting to the student of Nature.

Doubtless every physician has asked himself the question when a patient has applied to him to relieve an aching tooth, Why cannot the enamel of the tooth be replaced by repair or growth as bone or other tissues? Every surgeon amputates a limb with the assurance that the end of the bone will heal over. The fractured limb will unite under proper treatment and coaptation of the parts, or in other words the separation of the continuity in bone will be replaced by new bone, but when the enamel of a tooth has been fractured or destroyed the reparative process is wholly wanting, and unless some artificial process is resorted to the wound increases until the tooth or its usefulness is destroyed.

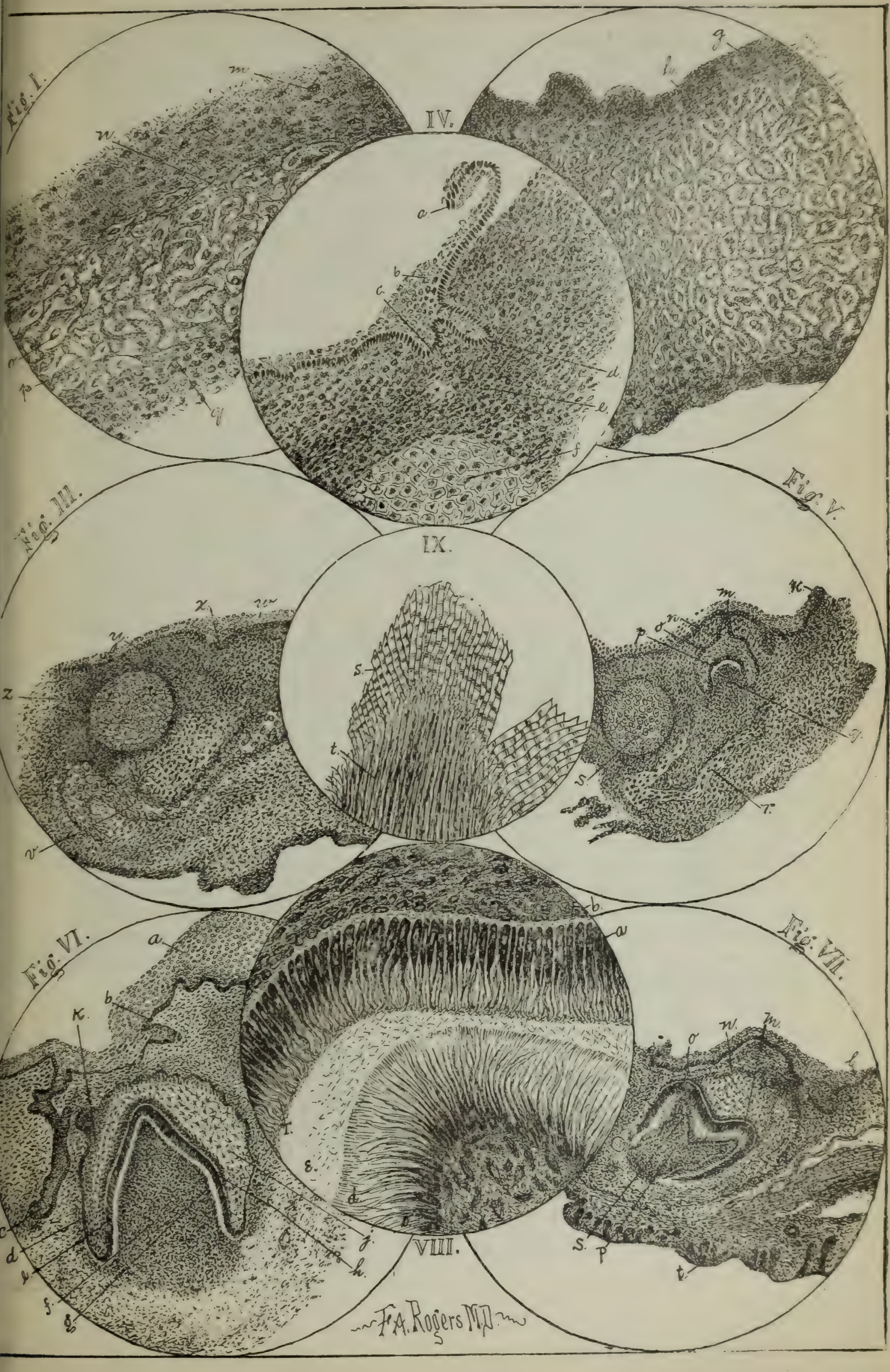
Fig. I.
m
w
r
p
q
IV.
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c
d
e
f
g
h
Fig. III.
x
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y
z
v
IX.
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Fig. V.
m
k
o
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p
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s
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Fig. VI.
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b
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VIII.
Fig. VII.
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F.A. Rogers M.D.

Close as the analogy may appear to the casual observer, a wide disparity is seen to exist when we study the origin, development, and appearance of each in detail, and it is only when we have followed out this that we can give any valid reasons which will answer the foregoing question.

From a few human embryos, and also from several small animals, I have mounted many hundred sections of bone and of the inferior maxilla which, when contrasted, have suggested the theme of this paper. These embryos had been preserved in ordinary alcohol, some of them for several years. The part which I wished to study, as for instance the lower jaw, was carefully dissected out by cutting from the angle of the mouth through the cheek directly back to the ramus and disarticulating from the temporal bone, then dividing at the symphysis mentis and removing the tongue; each part was placed in borax-carmine staining fluid for twenty-four hours, then into the discharging fluid for twenty-four hours, after which the specimen was treated with each of the following for twenty-four hours, successively: alcohol ninety-five per cent., alcohol absolute, and chloroform; after this it was transferred to paraffin kept at the temperature of from 115° F. to 125° F. for six hours, then after suddenly cooling the paraffin with the specimen within, it was transferred to the microtome and sectioned as desired. By using care in trimming the paraffin close to the specimen and in such a way that a section across the top would be a small square, I have succeeded in mounting from sixty to eighty consecutive sections under one ¾-inch cover-glass. The mounting was done as follows:

The size and position of the cover-glass in relation to the slide having been outlined in paper, the glass slide was lightly smeared over with a fixative of egg-albumen two parts, glycerin one part, and placed over the outlined paper. Upon this slide the ribbon of sections was arranged to read like the lines of a book, and gentle pressure with the finger-tips fixed them in place. The slide is heated until the paraffin melts, then it is immersed in benzol, where it remains five minutes, or until the paraffin is dissolved, when it is cleared in oil of cloves and mounted in balsam.

In order properly to differentiate bone and enamel, let us briefly consider the development and structure of each. What is bone? "Bone is simply an aggregation of calcospherules." (I quote this and several of the following passages from Sudduth.) The calcospherules are but houses occupied by the osteoblasts, a specialized cell destined to perform a special work,—namely, that of building the bony spherule which is called the calcospherule. Before the osteoblast begins to perform its function as a bone-builder by throwing out a thin covering, thus completely encasing itself, it has attained its greatest size, and from this time on the covering or calcospherule grows at the expense of the osteoblast, so that a section of newly-formed bone will reveal a mass of calcospherules united in no regular order, and the osteoblasts may frequently be seen lying within, having been reduced to one-third or one-fourth of their former dimensions. (See Fig. 1, *o.*)

Each osteoblast secretes its calcospherule, and when this process is complete, its work as a bone-builder is at an end; from this time onward it simply "occupies the house it has constructed," ready, should occasion require, to repair any damage which may be done to its individual home. From this it might be inferred that each osteoblast lived the life of a hermit, having no communication with its surroundings. Such is not the case. When the calcospherule is being formed, the osteoblasts, which previously were in contact with each other, do not break up these points of contact but permit them to be drawn out into fine processes, and these continue to establish a union between the cells of bone.

The canals in which these processes lie have been known as the canaliculi, the interior of the calcospherules themselves as the lacunæ, while the capillary circulation in bone comprises the "Haversian canals." From these canals, through the intercommunication of the processes, the osteoblasts receive nutrient material.

This now brings us to the consideration of the various ways in which bone is developed. Different authors classify the development of bone differently, but as it is the intention of this paper to show the difference as a whole between bone and another substance, the selection of two classes of development will suffice. The selection which has been made and illustrated in Figs. 1 and 2 represents a type of intramembranous and intercartilaginous development. In both figures the calcospherules and contained osteoblasts are plainly seen. In Fig. 2 the contour of the cells is more regular, and at the left of the figure cartilage-cells may be noted.

After briefly noticing the structure and development of bone, let us ask the question, Whence originates the osteoblast? Sudduth says, "In the first instance I am pretty fully convinced that they are the ordinary embryonic connective-tissue cells." Here he refers to his classification of "interstitial development;" again, "In some instances osteoblasts are produced from connective-tissue cells; sometimes they have their origin in cartilage-cells;" and again, "Connective tissues arise from the mesoblastic layer of the blastoderm." One thing seems to be conclusive, that all forms of bone development are the product of the mesoblast or middle layer of the blastoderm. In the study of the enamel-organ we shall first notice that it originates from the epiblastic or outer layer of the blastoderm. The two layers which originally comprise the blastoderm are known as the epiblast and hypoblast. Very soon after incubation in an egg another layer, known as the mesoblast, appears; from this layer, as we have already noticed, bone is derived. It remains for us now to consider one of the interesting products of the epiblast.

The nails, hair, sebaceous glands, enamel-organ, as well as the epidermis, are alike products of the epiblast layer. No one has yet been able to say why the cells of this same layer should produce hair in one place, nail in another, sebaceous glands in another, and mucous membrane and teeth with the dense enamel in very close proximity elsewhere, especially when in its incipiency the epiblast bears such a striking resemblance to the adjacent mesoblast; yet if the process of development be not interfered with, the greatest contrast results in their product. At an early period differences can be shown between these layers. The epiblast stains more readily and darkly than the mesoblast, and more space exists between the mesoblastic cells than between the others.

In Fig. 4 both of these statements are verified, also it will be seen how easily the two layers may be separated artificially. In its incipiency the inferior maxilla arises from two lateral bud-like processes composed of mesoblastic cells nearly surrounded by an epiblast or infant layer. These unite in front, forming the symphysis mentis; and running through and occupying a central position Meckel's cartilage may be found.

Upon the crest of the gum, in the infant or epiblastic layer which covers it, may first be seen active cell-multiplication which results in a depression or a growing of this layer into the connective tissue beneath. This is illustrated in a transverse section. (Fig. 3, *x*.) At certain points along this groove the cell-multiplication increases more than at other parts, causing bud-like processes which extend into the connective tissues beneath, forming cords which correspond to the enamel-organs of the several temporary teeth.

At the commencement of this infolding of the infant layer the band is broad; from one side a lamina is given off which develops into the cord. This develops rapidly, sinking deeper into the mesoblastic or connective tissue, and while at the point of origin it is narrow, at the bottom it broadens, assuming a club- or pear-shaped appearance.

It is made up of a solid ingrowth of cell, formed, as just explained, from the lamina, which arose from the band and which in turn originated from the infant epiblast or epithelial layer of the mouth. In a short time the bottom of this cord becomes flattened and finally invaginated by contact with the mesoblastic cells, which now assume new characteristics and become known as the dentinal papilla, or the future pulp of the tooth. (See Fig. 5, *q*.) The cord and dentinal papilla now oppose each other in growth, one growing downward into the jaw, the other upward or toward the gum. As a result we have an organ known as the enamel-organ, made up from two kinds of cells, epiblastic and mesoblastic, united to accomplish one end, viz, that of forming the tooth.

This combination, one of the most striking in the animal economy, from this time onward forms a new, independent creature, so to speak, and the result is a product unlike that found elsewhere among mammals. We will notice briefly the organ as a whole, and separately the outcome of each class of cells.

As a combination the enamel-organ sinks deeper into the tissues, and the neck of the cord grows smaller and narrower until finally it separates from the mother epiblastic layer entirely. The organ is now wholly beneath the surface, where it is entirely surrounded by mesoblastic cells, as illustrated in Fig. 6. The dentinal papilla pushes its way onward and upward, carrying the two epiblastic layers, now known as the outer and the inner tunics, nearer together at the apex of the tooth.

A moment's reflection will substantiate the fact that the cells which are inclosed by the tunics are simply epithelial cells derived originally from the mucous membrane of the mouth, lying as they did originally upon the surface and being a part of the epiblast. In the original from which Fig. 6 was taken, the cells around the inner edge next to the tunic, as at *k*, Fig. 6, are distinctly epithelial in appearance, while those in the interior, as at *j*, are changed to a stellate form; this is now known as the stellate reticulum. But it is at the point where the papilla and the inner tunic of the epiblast are striving for the mastery of position, so to speak, that the most wonderful changes occur.

Between the surface of the enamel-organ and the dentinal papilla, no union occurs; simply one surface is perfectly adapted to the other. Authority states, that "vessels or nerves have never been demonstrated to pass from one to the other," and from the fact that the enamel and dentine, both of which are products of these organs, can be very easily separated from each other, it is proved that no union was ever established.

At this point the shape of the cells which lie in opposition, as at *g*, *h*, Fig. 6, or *o*, *s*, Fig. 7, are changed very materially. They become crowded together into line, losing their oval form and becoming columnar or prismatic.

The cells of the inner tunic are now known as the ameloblasts, while the terminal ones of the dentinal papilla are known as odontoblasts. Between these layers of cells is formed the dentine belonging to the odontoblasts, while the enamel is formed under the superintendence of the ameloblasts. (See Fig. 8, *a* and *o*.)

Up to this time we have only considered the formation and development of the temporary tooth. The permanent tooth is developed in much the same way, only the cord is longer and more slender.

It arises from the same infant layer, generally from the same cord as does the temporary tooth, and directs its way down between the tooth and follicular wall, behind the temporary tooth; there it undergoes the same process as its antecedent. (See Fig. 6, *c*.)

The deposition of enamel and dentine is from one end only of their respective cells, and only in a direction toward each other. In this respect bone-development differs very materially, for we have noticed that in the development of bone the osteoblasts do not become themselves calcified, but the lime-salts are deposited around the osteoblasts in the calcospherules, thus completely incasing them. In the development of dentine, although the odontoblasts do not themselves become calcified, yet the dentine is deposited only from around their fibril ends in a tubular form. The deposition of enamel is in much the same way; the ameloblasts are not themselves calcified, but they deposit the prismatic enamel from the end next to the odontoblasts. (See Fig. 8, *e*, *d*.)

The dentine consists of a solid mass of calcified tissue arranged in a tubular form around the fine processes of the odontoblasts. The enamel is a still more condensed structure of calcareous matter, consisting of hexagonal prisms arranged side by side and very closely together. "I look upon enamel as nothing more or less than a coat of mail supplied by Nature to protect the dentine and subserve the process of mastication" (Sudduth).

Before the tooth issues from the bed of the jaw, the outer tunic has completely disappeared, and the enamel upon the apex of the tooth having been fully formed, the ameloblasts which produced it, having served their purpose, have also disappeared, so that whatever injury is done later to the enamel no provision is made for its repair.

Then briefly to recapitulate. We have noticed how that bone originated from one class of cells, the enamel from another; how that early in embryonic life a difference is seen in the appearance and course taken by each class of these cells; how that working together in one organ they produce results unlike the product of either separately. And upon the theory that one kind of cells cannot produce another kind, we recognize the early manifestations of that natural law which keeps them separate, yet wonderfully harmonizes and adapts each to the other in one product, the tooth. After having briefly contrasted the origin and development of these tissues, we will conclude by answering the question asked at first, by saying that in the formation of most tissues provision is made for repair: in bone by the encapsulated osteoblasts ready when called upon to secrete, as in the development, calcareous matter; while in the enamel the source of the supply of material being lost in the disappearance of the ameloblasts and rupture of the tooth through the gum, no provision is made by Nature for repair should this interesting structure be destroyed.

EXPLANATION OF FIGURES.

FIG. I.—× 750. Section through the parietal bone of a two-months' human embryo, showing the osteoblasts, *o*, and calcospherules, *p*.

FIG. II.—× 750. Horizontal section at the junction of a rib, and transverse process of a dorsal vertebra in a two-months' human embryo; *g*, osteoblasts; *h*, calcospherules.

FIG. III.—× 100. Transverse section through the inferior maxilla of a six-weeks' human embryo; *w*, epithelium; *x*, band for future tooth; *y*, infant layer; *z*, Meckel's cartilage; *v*, developing bone.

FIG. IV.—× 300. Transverse section through the inferior maxilla of a two-months' human fœtus; *a*, infant layer, epiblasts accidentally separated from the mesoblasts; *b*, epithelium; *c*, band; *d*, cord for tooth; *e*, connective-tissue mesoblasts; *f*, Meckel's cartilage.

FIG. V.—× 65. Transverse section through the inferior maxilla of a three-months' human fœtus; *k*, epithelium; *m*, neck of cord; *n*, infant layer; *o*, outer tunic; *p*, inner tunic; *q*, dentinal papilla; *r*, developing bone; *s*, Meckel's cartilage.

FIG. VI.—× 125. Transverse section through the inferior maxilla in the region of a cuspid of a four-months' human fœtus; *a*, epithelium; *b*, infant layer; *c*, cord for permanent tooth; *d*, outer tunic; *e*, inner tunic; *f*, dentinal papilla; *g*, odontoblasts; *h*, ameloblasts; *j*, stellate reticulum.

FIG. VII.—× 65. Transverse section through the inferior maxilla, region of a molar, of a young mouse two or three days old; *l*, epithelium; *n*, outer tunic; *o*, ameloblasts; *p*, dentinal papilla; *s*, odontoblasts; *t*, hair-follicle.

FIG. VIII.—× 1000. Enlargement from Fig. VII at the point *m*; *a*, ameloblasts; *b*, stratum intermedium of Hanover; *t*, Tomes's processes; *e*, enamel newly formed; *d*, dentine; *o*, odontoblasts; *s*, dentinal papilla.

FIG. IX.—× 350. Section through the tip of a human incisor; *s*, enamel-prisms; *t*, dentine. The section was ground as thin as possible, and afterward treated with dilute hydrochloric acid, 1 to 500, to separate the prisms.

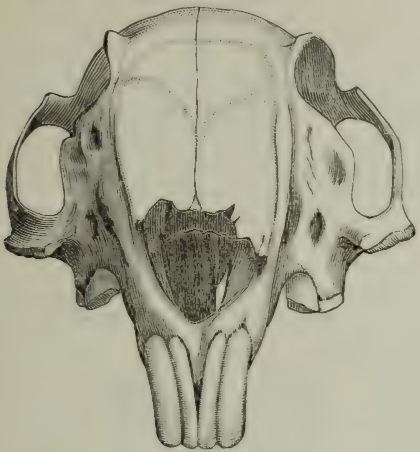
All the figures, except Fig. IX, were drawn from photographs made by the author, and in his possession. The sections were borax-carmine stained; Carbutt's instantaneous plates were used for making the negatives; B. & L. $\frac{3}{4}$ and $\frac{1}{5}$ objectives, student series, and J. W. Queen & Co.'s $\frac{1}{15}$ oil immersion were used for photographing. Fig. IX was drawn by means of a camera-lucida.

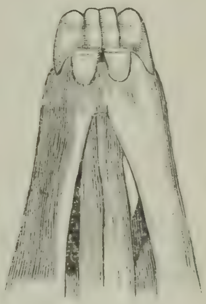
—*F. A. Rogers, M.D., in The Microscope.*

HINTS AND QUERIES.

An Aberrant Dentition.—The cranium represented by the accompanying figures was received from Dr. E. T. Guice, of Terrell, Texas, and was handed to Professor C. N. Peirce, who has kindly written the following account.—Editor Dental Cosmos.

"The skull sent me is that of a mammal, order Rodentia, suborder Rodentia Duplicidentata, family Leporidæ, or, as named by Dr. J. L. Wortman, Lepus Sylvaticus.





"The Rodents form what are termed by zoölogists a compact order, readily recognized by their prominent chisel-shaped incisors and absence of cuspids or canines. They include something over eight hundred species, and have the widest or most general distribution of any of the orders of terrestrial mammals. They are divided into two great suborders, viz, Rodentia Simplicidentata and Rodentia Duplicidentata. The former have two incisors only, in the upper jaw, and on these the enamel is confined to their front or labial surfaces ; the latter have four incisors in the upper jaw, two of them very small and placed directly behind or on the palatine surface of the larger and more conspicuous centrals. The enamel on these, as in the majority of the order, Mammalia, to which it belongs, encircles or extends around the tooth. In the embryo of this suborder there are six incisors, the two outer of which are lost soon after birth ; but in this aberrant feature it shows its relation to the order of which it is one, and also its intermediate and transitional position.

"The apical foramen of these incisors is in all four large, demonstrating their growth as being uninterruptedly from permanent or persistent pulps, as do those of the more specialized group or suborder Rodentia Simplicidentata. These additional incisors give the total number of teeth in this variety as thirty-two, instead of twenty-eight, which is common to the more specialized.

"The peculiar fluted appearance which the labial or anterior surface of these large superior incisors presents is confined to this suborder. This peculiarity is a strong indication that the teeth have had their origin from duplicate germs with separate calcific centers. If this should prove true, it would only be an additional link attaching them to mammalian or ancestral peculiarities which have been entirely obliterated by the food habit of the more divergent and specialized.

"The molars of this animal do not vary in number and shape from those typical of the order, unless they be a little less specialized. They have tuberculated, flattish crowns, well adapted to the attrition of food. As stated above, the order Rodentia is a group of animals well defined, their dental development and its arrangement making them easily distinguished."

Repair of Crown- and Bridge-Work.—The repair of crown- and bridge-work *in situ* has never been a success. Various methods have been devised and set forth in current dental literature, but not one of them has proved either scientific or satisfactory. Realizing the urgent need of some better way, I have hit upon the following simple and efficient method:

Remove the *débris* from the place of fracture. Grind a porcelain facing to fit. Back the tooth with gold or platinum to suit the required shade. Have the pins well flattened and pressed down on the backing. Bore a hole through the gold in the bridge-piece where it is most desirable to have the post placed. Make the opening of such dimensions that ordinary-sized iridio-platinum wire will fit snugly. Square the hole with a fissure-bur to conform with the shape of the wire. Adjust the tooth in proper position. With a small-pointed instrument mark on the backing of the tooth through the hole in the denture the place where the opening meets the facing. Remove the tooth and solder the end of the post on the backing where marked. Have the post of sufficient length to protrude about one-eighth or one-sixteenth of an inch on the lingual aspect. Cause the solder to flow thoroughly over the parts, being careful to avoid covering the pin except at the attached end. Remove any excess of solder, making the same smooth and symmetrical. Grind from the labial aspect sufficient to allow for extra thickness of gold on the backing. With a thin steel ribbon-saw divide the end of the post, sawing a little below the point of emergence. Countersink the lingual side of the denture to conform to each half of the split post. To attach the tooth use cement, and before it sets bend the two halves of the post steadily and firmly into the grooves prepared for them. Use long-nosed pliers or forceps to press the ends of the post in place, resting one beak against the front side of the facing, the same being protected with a cushion of spunk or bibulous paper. Fill any remaining depressions on the lingual side with gold-foil, making anchorage pits if necessary. If the details of the work have been faithfully adhered to, it will be found that the repair, instead of, as heretofore, being the weakest point, will be as strong as the denture itself. By the way, the very fact of the breakage usually indicates that the place of fracture is the place of greatest wear, hence, when mended, *this* should be *at least* as strong as before. With this improved system of repair the merits of cemented dentures are enhanced manifold, and bridge-work "crowned" with new beauty and strength.—W. W. Williamson, Syracuse, N. Y.

Alabama Dental Association.—The secretary informs us, too late for insertion under the usual heading, that by mistake he gave the wrong date for the meeting of the above association. It should have been April 14, and not the 9th, as published in our March issue.—Ed. Dental Cosmos.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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ON THE COMPARATIVE RAPIDITY WITH WHICH DIFFERENT ANTISEPTICS PENETRATE DECALCIFIED DENTINE; OR, WHAT ANTISEPTIC SHOULD BE USED FOR STERILIZING CAVITIES BEFORE FILLING?

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THE practice of superficially washing out cavities of decay before filling with some substance possessing antiseptic properties was carried out by many practitioners long before our views regarding the etiology of dental decay had taken the definite form which they now have. Many years ago a well-known teacher of dentistry remarked to me that he always bathed the cavity with creasote before filling; just why he could not tell, but he had a feeling that it might have a beneficial action,—at least it could do no harm. At present the practice is universal, and the object to be obtained is the devitalization of germs which may not have been removed by the process of excavating.

The developments of the last decade in regard to the etiology of dental decay and to the physiology of the low forms of vegetable life concerned in the causation of it, teach us that this practice is in every way commendable. The fact has been well established that many bacteria possess the power not only of living and propagating themselves, but also of manifesting their characteristic action under partial or complete exclusion of air, and even that for the existence of certain species of bacteria the exclusion of air is absolutely essential; if, therefore, we leave traces of softened dentine on the walls of our cavities, unless it has been thoroughly sterilized, even an air-tight filling will be no guarantee against the progress of decay in the already softened parts. Most particularly in all cases of acute caries, where the softening has progressed nearly or quite to the pulp and the dentine is completely saturated with moisture and bacteria, if we for any reason do not effect the complete removal of the infected parts, the thorough sterilization must form the basis of all attempts at conservative treatment; otherwise we have no certainty that decomposition may not take place under the filling, leading to exposure or septic inflammation of the pulp.

I think, however, that the facts are pretty generally recognized by the profession, so that with the mere statement of them we may at once proceed to the question, With which material can we best effect the desired purpose?

In this matter more unity of practice exists than in the treatment of root-canals, capping of exposed pulps, etc., the vast majority of dental practitioners being in the habit of bathing the cavity before filling with concentrated carbolic acid.

No attempt, however, has been made, as far as I know, either clinically or experimentally to determine the relative sterilizing power of various antiseptics upon carious dentine, or, in other words, which of the various antiseptics at our disposal are best adapted to the purpose and how much time they require. There are several ways in which the question may be approached experimentally, some of which I will briefly describe.

Methods of Experimentation.

I.

A number of freshly extracted teeth with cavities containing large quantities of softened dentine are washed in water and placed in a vessel holding a sufficient amount of the antiseptic to completely cover them. Here they are allowed to remain from half an hour to one and a half or even two hours, according to the known power of the antiseptic. They are then removed with a pair of sterilized pliers, thoroughly rinsed in alcohol, which of course must be free from germs, and then again in sterilized water, the object being to entirely remove the antiseptic from the surface of the tooth. The teeth having been dried with sterilized bibulous paper, the roots are wound about with sterilized paper so that they may be held between the fingers without coming in contact with the crown. Having then some half-dozen thoroughly sterilized spoon-shaped excavators at hand, we remove the carious dentine layer after layer till we reach the bottom of the cavity, or we may succeed in peeling out the whole of the decayed dentine in one piece, care being taken not to let the instrument come into contact with the dentine at the bottom of the cavity. Of the latter a small piece is chipped out with a fine excavator and carefully conveyed to a plate of agar-agar. In like manner a second piece is put into a tube of bouillon. If now the piece of dentine becomes surrounded by a growth of micro-organisms, or if the bouillon becomes clouded, we know that the antiseptic had not completely sterilized the whole mass of the dentine. If, on the other hand, no growth takes place either in the bouillon or on the agar-agar, we are justified in concluding that the whole mass of the dentine had become permeated and sterilized.*

This experiment requires great care, and can only be carried out by one who has had considerable experience in bacteriological work and understands how to avoid the many errors of experiment which are so liable to occur in this manipulation.

The results obtained by this method will be given in detail below. I wish only to remark in this connection that living bacteria may sometimes be found in teeth which have laid for one and three-quarters hours in concentrated carbolic acid, and that my earliest observations in regard to this matter, reported in the DENTAL COSMOS for January, 1881, are in complete accordance with the facts.

II.

The power of antiseptics to permeate decalcified dentine may also be determined by aid of the apparatus illustrated in Fig. 1. A small glass vessel was cut in two, and the cut edges of the two halves ground so as to fit accurately together. A section of softened dentine from an elephant's tusk was then inserted between the two halves, and the latter pressed together by means of a small screw frame. Two-thirds of one half of the glass vessel was filled with the antiseptic, the other half to an equal amount with an infected solution of bouillon, and the time determined which elapsed until a sufficient amount of the antiseptic had passed through the ivory partition from *a* into *b* (Fig. 1) to sterilize the contents of *b*.

III.

Small glass vessels are filled with the antiseptic to be tested, and covered with plates of decalcified ivory of equal thickness. Upon these plates are laid a number of small pieces of decalcified ivory or dentine. As soon as the antiseptic passes through the plate of ivory in sufficient quantity to act upon the small piece of dentine, the latter itself acquires an antiseptic action and consequently inhibits the growth of bacteria in its neighborhood when it is placed on a plate of gelatine or agar-agar (Fig. 2). We accordingly take the small pieces of ivory from each vessel, one at a time, at intervals of about ten minutes, and put them upon a plate of infected gelatine or agar-agar. Any antiseptic action which the pieces may have acquired will be shown by the presence of a transparent zone around them after the plate has been kept from one to two days.

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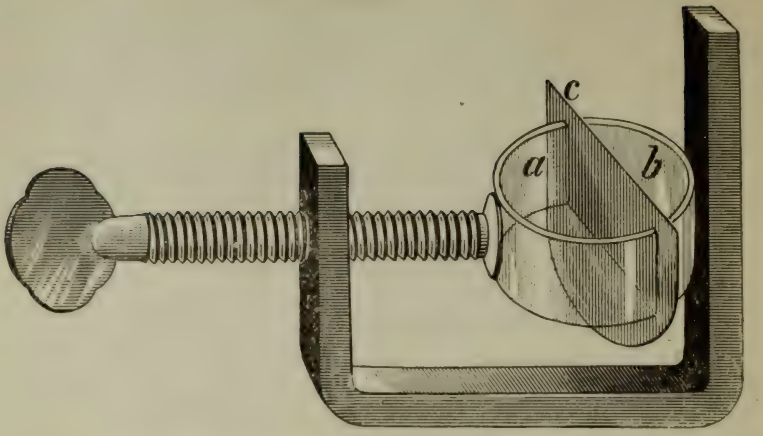
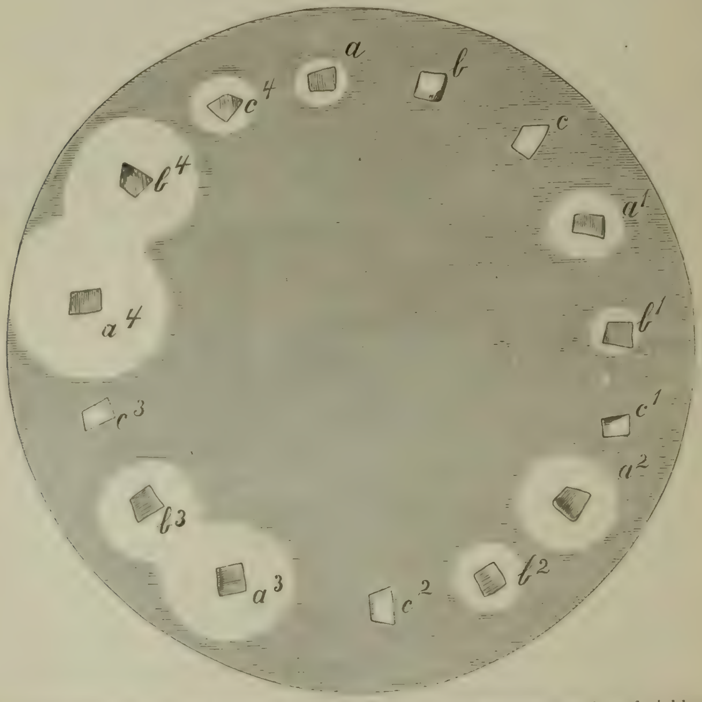
* This statement would suffer a restriction if it should be found that the deep parts of decayed dentine contain non-cultivable bacteria.

FIG. 1.



Apparatus used in method II. *a*, *b*, the two halves of a small glass vessel; *c*, a thin plate of decalcified ivory.

FIG. 2.



Illustrating method III. and showing the relative penetrating antiseptic action of trichloride of iodine, bichloride of mercury, and oil of cinnamon through a plate of decalcified ivory. *a*, *b*, *c*, after 15; a^1, b^1, c^1, 20; a^2, b^2, c^2, 25; a^3, b^3, c^3, 30: and a^4, b^4, c^4, 40 minutes. See description of method III.

IV.

A tube of gelatine is richly inoculated with a mouth-bacterium which grows rapidly at room temperature without liquefying the gelatine, and then poured upon a glass plate after the usual manner of making plate cultures. As soon as the gelatine has become thoroughly stiffened, a large plate of decalcified ivory, which must be entirely free from acid, is placed upon it; any air-bubbles which may become inclosed must be got rid of. Upon this plate we place a number of pledgets of cotton saturated with various antiseptics, and cover up the plate with a bell-jar or an ordinary glass cover, kept moist on the inside by a lining of wet bibulous paper (to prevent the warping of the plate of ivory). After any determined time, carefully peel off the ivory plate from the gelatine and put the latter away in a moist chamber. In twenty-four to forty-eight hours the plate will be densely clouded except at those points where the antiseptics from the pledgets of cotton have passed through the plate of ivory in sufficient quantity to prevent the growth of the micro-organisms in the gelatine; these points will be marked by a circle of transparent gelatine.

FIG. 3.

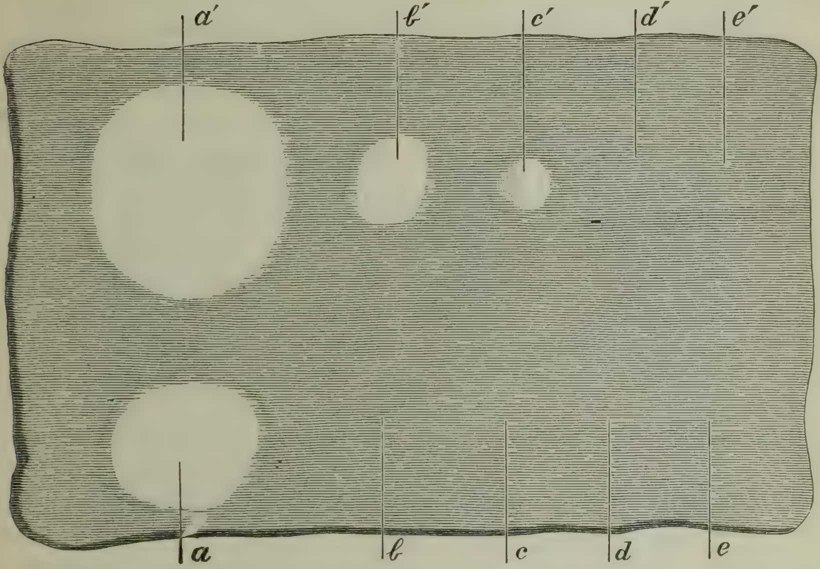


Plate illustrating method IV, and showing the penetrating antiseptic power of the trichloride of iodine, bichloride of mercury, carbolic acid, chloride of zinc, and oil of cinnamon through a plate of decalcified ivory 0.75 mm. thick. *a*, *b*, *c*, *d*, *e*, after an action of 14; *a′*, *b′*, *c′*, *d′*, *e′*, after an action of 25 minutes. It will be seen that in 14 minutes only the trichloride had passed through in sufficient quantity to sterilize the gelatine. After 25 minutes the chloride of zinc and oil of cinnamon still show no action.

I have found this method to be the simplest and most easy of carrying out; it should not, however, be relied upon alone, but should always be controlled or checked by parallel experiments by the other methods, particularly by method I.

There are still other ways of carrying out these experiments, some of which I have also made use of, but those already given will suffice, I think, to show the principles involved.

RESULTS.

One general result of these experiments already referred to above is the establishment of the fact that the thorough sterilization of decayed dentine requires more time and care than we are accustomed to bestow upon it.

If we wish to be sure that we have completely sterilized a layer of dentine 1 mm. thick with carbolic acid, for example, we must allow the solution to act at least three-quarters of an hour; nor does it suffice simply to moisten the surface with the acid; the whole cavity must be thoroughly bathed with it. Simply wiping out a cavity with carbolic acid and immediately drying it, gives no guarantee whatever that any softened dentine present has become sterile.

Up to the present time I have tested the following materials: 1, chloride of zinc; 2, five per cent. solution of bichloride of mercury; 3, five per cent. solution of trichloride of iodine; 4, five per cent. solution of pentachloride of phosphorus; 5, double chloride of gold and sodium; 6, double chloride of potassium and platinum; 7, trichlorphenol; 8, carbolic acid; 9, lysol; 10, peroxide of hydrogen; 11, oil of cinnamon; 12, oil of cloves; 13, oil of peppermint; 14, oil of wintergreen; 15, pyoktanin; 16, resorcin, ten per cent. solution; 17, benzoic acid, ten per cent. alcoholic solution; 18, absolute alcohol; 19, thymol, twenty per cent. alcoholic solution. Of those substances just mentioned which have not been used in dental surgery, or received notice in the dental periodicals, I wish to call particular attention to the

Trichloride of Iodine.

This preparation was recommended as an antiseptic by Riedel and Langenbuch in 1887. It is a brick-red powder which has an irritating smell of chlorine. It may be had in quantities of ten grammes in hermetically sealed tubes, and is best kept in five per cent. aqueous solutions, which appear to remain unchanged indefinitely, or at least for some months, though I have sometimes noticed a slight increase in the acidity of the solution. Langenbuch* claims that a 0.1 to 0.15 per cent. solution is equal in antiseptic action to a 0.5 to 1.0 per cent.

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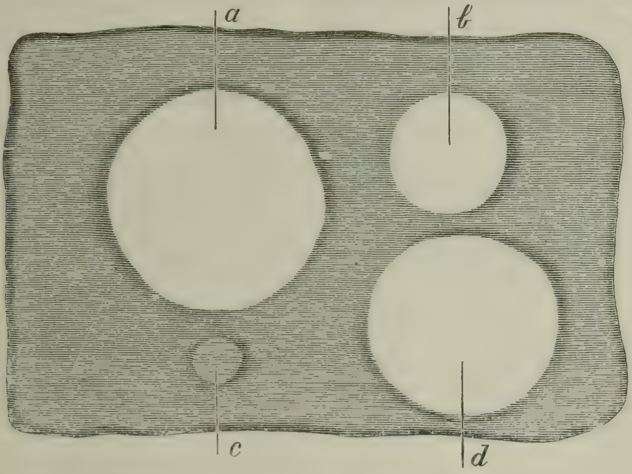
* "Ueber die Brauchbarkeit des Iodtrichlorids als Desinficiens und Antisepticum." *Berl. Klin. Wochenschrift*, No. 40, 1887.

solution of bichloride of mercury; in other words, that it is about five times as efficient as the bichloride. The five per cent. solution has but slight escharotic effects when compared with concentrated carbolic acid.

In order to compare the two, I put a drop of carbolic acid upon my arm and near it a drop of five per cent. solution of trichloride of iodine; the result, as expected, was a disagreeable wound produced by the carbolic acid, but not a trace of any action on the part of the trichloride.

It is also claimed by prominent authorities to be *relatively* the least poisonous of all antiseptics. Behring* found that *in aqueous solutions, having equal action upon the spores of anthrax bacilli*, sublimate is five to six times, and carbolic acid and creasote seven to eight times, as poisonous as the trichloride.

FIG. 4.



Showing the relative antiseptic power of trichloride of iodine *a*, bichloride of mercury *b*, carbolic acid *c*, and peroxide of hydrogen *d*, acting 40 minutes through a decalcified plate of ivory about 1 mm. thick.

We have consequently reasons to hope that the trichloride of iodine may prove a valuable remedy in the treatment of diseased conditions of the teeth and mouth. I have begun to use it in the clinic of the dental institute, and shall report the results in connection with experiments which are being carried on in the laboratory.

Its efficiency as a disinfectant for carious dentine was tested six times by the first method and thirty-five times by the fourth. The results obtained by the latter method were exceedingly good, as shown in Figs. 2 to 4. The first method also gave good results, though not quite so striking as those obtained by the fourth. The impression gained on the whole was that the five per cent. solution of the trichloride of iodine is one of the most active agents at our demand for effecting the purpose in question.

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* "Über Desinfection, Desinfectionsmittel und Desinfectionsmethoden. *Zeitschrift für Hygiene*, Bd. 9, 1890, pp. 395–478.

I will not fail, however, to call attention to the fact that this solution has a distinctly acid reaction which must be taken into consideration in attempting to put a proper estimate upon the value of any substance to be used upon the teeth.

The Bichloride of Mercury,

which usually ranks as the king among antiseptics, was tested by each of the four methods, in all sixty-three times, with uniformly good results, although particularly in method IV it fell considerably short of the striking action shown by the trichloride of iodine.

The pre-eminent position held by the chlorides among the antiseptics suggested the thought that other chlorides, containing a still higher number of atoms of chlorine, might have a still more powerful action. I was accordingly led to make a test of the *pentachloride of phosphorus*, which, tested by method IV, proved to have a penetrating action superior to that of the bichloride of mercury, but not, however, equal to that of the trichloride of iodine. This fact is interesting chiefly from a theoretical stand-point, since the intense acid reaction of the pentachloride renders it unfit for use in the mouth.

The Peroxide of Hydrogen

was tested thirteen times by method I, and fourteen times by method IV. The results obtained by the two methods were strikingly at variance with each other : tested by method IV, it appeared to be one of the *most* active of the substances employed, whereas the first method showed it to be one of the *least* active. Two possible ways suggest themselves for accounting for this discrepancy. Either the products of decomposition present in the superficial layers of the decayed dentine disengage the atom of oxygen, which then escapes, leaving only the remaining portion of the molecule (*i.e.* water) to act upon the deeper portions of the dentine, the result being that while the superficial layers are speedily sterilized, the deeper ones are reached only by the inert water ; or, secondly, we may suppose that the bacterium made use of in the fourth method is peculiarly sensitive to nascent oxygen, hence the striking action of the peroxide seen in Fig. 4. I rather incline to think, however, that the first explanation suggested is the proper one, and that the peroxide, while an excellent sterilizer for thin layers, fails when applied to thicker ones.

Carbolic Acid

was tested fifty-nine times : fifteen times by the first method, twice by the second, twice by the third, and forty times by the fourth. The results obtained harmonized pretty well throughout, and showed that while the carbolic acid is a very active antiseptic agent, it falls considerably behind the bichloride of mercury and trichloride of iodine in its penetrating power.

Trichlorphenol and Lysol,

the former of which was tested eleven times, the latter but four, gave results very similar to those obtained by carbolic acid.

Chloride of Zinc

in a supersaturated aqueous solution was tested by methods I and IV. By the latter it falls somewhat short of carbolic acid, by the former it quite equals it, if indeed it does not slightly surpass it. Its exceeding escharotic action and the pain often attending its application to the nearly exposed pulp in my opinion more than counterbalance any slight advantage that it might otherwise have over carbolic acid.

The Essential Oils

proved to be among the least efficient of the substances examined. In none of the tests made did the oils of *peppermint*, *cloves*, and *wintergreen* show any action whatever. In a few the oil of *cinnamon* turned out a little better, but its action was very slight when compared to that of the trichloride of iodine, bichloride of mercury, etc. In Fig. 2, illustrating method III, it will be seen that the trichloride of iodine (a, a^1, etc.) had about the same effect in fifteen minutes that the oil of cinnamon (c, c^1, etc.) had in forty minutes.

Likewise, in Fig. 3, illustrating method IV, we see the striking action of the trichloride and bichloride and the slight action of carbolic acid in twenty-five minutes, while in the same time the oil of cinnamon failed to exert any retarding influence upon the development of bacteria. In sixteen tests with various essential oils by the first method, in which the teeth were allowed to remain one and one-quarter to one and three-quarters hours in the oil, I found, without exception, *living* bacteria in the dentine at the close of the experiment.

Pyoktanin, *benzoic acid*, *alcohol*, *thymol*, and *resorcin* need not be referred to separately ; they all fell so far short of the standard of efficiency manifested by other antiseptics, that they could not come into consideration at all for sterilizing cavities before filling. The same is true also of the double salts mentioned under V and VI. I should add, however, that pyoktanin, resorcin, and the double salts were tested only by method IV.

I may say in reference to pyoktanin in this connection that I have tested its power in other directions, and always found it undeserving of the high praise which it has recently received in America.

In carrying out the experiments described, three hundred and fifty-four tests were made ; of these fifty-nine related to carbolic acid, sixty-three to sublimate, twenty-seven to peroxide of hydrogen, thirty-eight to chloride of zinc, eleven to trichlorphenol, fifty-four to oil of cinnamon, five to oil of cloves, ten to oil of peppermint, four to oil of wintergreen, three to benzoic acid, three to thymol, one to alcohol, four to lysol, forty-one to trichloride of iodine, seven to pentachloride of phosphorus, twelve to pyoktanin, eight to the double salt of gold and sodium, two to the double salt of potassium and platinum, and two to resorcin.

It may no doubt seem to most readers that *three hundred and fifty-four* experiments ought to definitely settle the question at issue, but to those who have been engaged in work of this nature for some time it will not appear so very strange that this should not be the case, but that more experiments should be necessary before the subject can be dismissed. It is therefore possible that the conclusions arrived at as the result of the above work may be modified by further experiments in the same direction. I am inclined to think, however, that the general results may be relied upon.

These are : 1. The complete sterilization of cavities of decay, especially such as contain traces, or even considerable quantities, of carious dentine, requires much more time than we are accustomed to give to it. When we have to sterilize a layer of some thickness, it is advisable, or we may say necessary, to apply the antiseptic on a pledget of cotton, and seal it in the cavity with the oxysulphate of zinc for one-half to one hour (or protect it in any way from the access of saliva) while some other operation is being performed.

In bad cases of acute caries, for example on the buccal surface of upper third molars, I not infrequently apply the antiseptic and leave it over night, in which case it must of course be protected by the oxysulphate, which is the only substance we possess which is at all adapted for inclosing applications on cotton.

2. The best results are obtained, as we should naturally expect, where rapidity of action is desired, by substances which are readily soluble in water ; it is for this reason, I take it, that the essential oils manifested so little action, their insolubility in the juices of the dentine preventing their rapid permeation of it.

In regard to the special results of these experiments I am, as intimated above, not quite prepared to express a decisive opinion, and reserve the right to modify my present views in any subsequent communication. At present I should head the list with the *trichloride of* *iodine*, were it not for its acid reaction, in regard to which further investigations are necessary.

There can also be no doubt about the powerful action of a five per cent. solution of the *bichloride of mercury.* The only question here to be taken into consideration is whether it might not lead to a slight discoloration of the tooth. This I doubt, though it might be advisable to restrict its use at first to the molars.

I do not consider that there is any danger attending the application of a pledget of cotton saturated with a five per cent. solution to a cavity of decay, as such a pledget would contain but a fraction of the usual internal dose of the bichloride, and might even be swallowed with impunity. I myself have used still stronger solutions in connection with the teeth.

As for the *peroxide of hydrogen*, which is one of the most agreeable of all our antiseptics, I am inclined to think that where *but very minute traces* of carious dentine are to be sterilized a ten per cent. solution of it will act efficiently.

Where the antiseptic may be left for some time, particularly over night, concentrated carbolic acid will be sufficient to effect the sterilization, provided the cavity has been at least partially excavated before application. The pledget must, however, be well saturated with the solution, otherwise the quantity will be too small to permeate more than a thin layer of dentine. It has the advantage of obtunding the dentine at the same time, while an injurious action upon the pulp is not to be feared, except it be almost or quite exposed. I shall return to this subject in a subsequent article.

THE MANAGEMENT OF ENAMEL MARGINS.

BY G. V. BLACK, M.D., D.D.S., JACKSONVILLE, ILL.

(Continued from page 100.)

THE INCISORS.

IN the February, 1891, COSMOS, I made a somewhat detailed statement of the lines of the enamel margins best suited to prevent recurrence of decay about proximate fillings in the molars and bicuspids; giving examples and illustrations. Also the weak lines of the enamel in these teeth were discussed. In the present paper I propose to discuss the arrangement of enamel margins in the incisors.

The incisors differ materially from the bicuspids and molars in being thinned away to cutting-edges at their occlusive portion; and thus present much less surface of near approach in their proximation. These are conditions more favorable to the permanence of fillings, since much less surface is exposed to especial liability to decay. But unfortunately this thinning away of the teeth to cutting-edges increases the difficulty of securely anchoring fillings. The exposed position of these teeth renders esthetic considerations important; making good appearance next in value to preservation. Indeed, whether rightly or not, many of our best patients will regard the good appearance of their incisors as fully equal in importance with their preservation. Therefore since the general introduction of the recent modes of artificial crowning it has become far too common to cut away badly decayed crowns of incisors for the purpose of putting artificial crowns on the roots; many of which make a worse appearance than would large gold fillings if neatly done. Furthermore, it should be remembered that in case of extensive decay of these teeth we shall have just as good an opportunity to make crowns after our gold fillings have failed as at present. And if the filling should serve for five, ten, or fifteen years, valuable teeth will have been saved to the patient that much longer by filling and afterward crowning, than by present crowning. Therefore while we may not be called upon to make as extensive buildings with foil as we were in the habit of doing before the introduction of the recent modes of crowning, our duties in filling have scarcely been diminished.

In general the placing of the lines of enamel margins in the incisors corresponds with the principles laid down (February COSMOS) for the bicuspids and molars. The reasons for this mode of treatment of the proximate surfaces of these teeth may be more fully explained by reference to the accompanying diagrams.

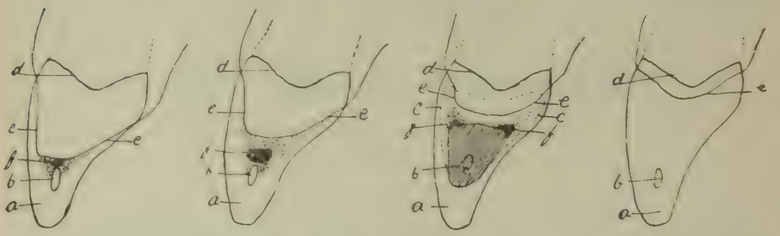


FIG. 22. FIG. 23. FIG. 24. FIG. 25.

Figures 22, 23, 24, and 25 represent the proximate surfaces of an incisor with progressive recession of the gum septum. *a*, angle; *b*, contact point; *d*, gingival line, or line of attachment of the soft tissues to the neck of the tooth; *e*, *e*, line of the free margin of the gum. In Fig. 22 this is almost complete; reaching nearly to the point of contact, and covering a large portion of the proximate surface. The figures show progressive recession of the gum septum until in Fig. 25 the recession is extreme. *f*, in 22 and 23, shows the usual point of initial penetration of the enamel by caries; and the shaded portions, areas of corrosion of the enamel in connection with the recession of the gum shown. Fig. 24, *b*, new point of contact on the filling, which later is shaded by dark lines; *f*, *f*, points of recurring decay. The shading in dots shows the area exposed to corrosion by the recession of the gum septum shown by the line *e*, *e*. *c*, *c*, dotted line showing where the enamel margins should have been placed to prevent recurrence of caries.

In Fig. 22 the proximate surface of the crown portion of an incisor is represented. The proximate contact is at *b*, and *d* shows the gingival line, or line of the attachment of the soft tissues to the neck of the tooth. The line *e*, *e*, represents the position of the free margin of the gum, and includes the portion of the proximate surface of the tooth usually covered by the gum septum in young persons. It is, however, slightly shrunken from the contact point *b*, which it should reach if perfect. This slight imperfection of the gum septum gives opportunity for the collection of *débris* at this point which, if other conditions favor it, undergoes acid fermentation. This results in corrosion of the enamel at this point, and the diagram represents penetration of the enamel at *f*, with corrosion of the enamel surrounding it.

In Fig. 23, with similar references, the recession of the gum septum is much greater ; and the amount of the enamel surface of near approach in the proximation uncovered, and exposed to the corrosive action of the products of fermentation taking place in the pocket formed between the teeth, is much greater. This is marked by stippling ; while *f* shows the point of primary penetration of the enamel. Fig. 24 represents a still greater degree of recession of the gum septum ; and Fig. 25 represents the most extreme degree of recession of the gum consistent with the health of the tissue attachment at the gingival line.

This recession of the gum in moderate degree occurs in a large proportion of persons, from causes which appear not to have been studied with much care. Indeed, not many in the dental profession seem to have regarded the matter as of much consequence. It seems that many of the beginnings of decay occur before any considerable degree of recession has taken place. This is probably due to forcing particles of food past the contact point, and lodging it against the margin of the gum septum until acid fermentation occurs. With the corrosion and roughening of the enamel which results, the habit of lodgment becomes fixed. This, while it becomes the cause of decay, also becomes the cause of increased recession of the gum septum. Now it will readily be seen that if the cavity represented in Fig. 22 be cut out in the form represented by the area of line shading in Fig. 24 and filled perfectly, it would be safe so long as the gum septum remained as represented in Fig. 22, for the portions of the margin not self-cleaning would be protected by the gum septum. But if by injury to the gum septum during the operation, or from other causes, it should permanently recede to the line *e*, *e*, in Fig. 23, a portion of the enamel margin at the linguo-gingival angle represented at *f*, in Fig. 24, would be uncovered and be of too near approach to the adjoining tooth to be self-cleaning ; and therefore especially exposed to corrosive agents. Therefore recurrence of caries at that point would be liable to take place. If the gum septum should recede as far as the line *e*, *e*, Fig. 24, the whole of the gingival enamel margin would be exposed. That is to say, that portion of the enamel margin is not in position to be self-cleaning, nor is it protected by the gingival septum of the gum. It is exposed to extreme liability to corrosion by the products of acid fermentation occurring in the pocket formed between the flattened surfaces of the teeth, and recurrence of penetration, and decay, along the line of enamel margin. Now if we suppose that the recession of the gum is a gradual process, which seems to be the case in a large proportion of cases, the first danger to the enamel margin will occur at the linguo-gingival angle of the filling, and the next at the labio-gingival angle (Fig. 24, *f*, *f*). Decay will therefore begin at these points, and corrosion of the enamel will extend over the stippled area following the recession of the gum. To have made this case safe against recurrence of decay, supposing such a recession of gum as that marked in Fig. 24 to occur, the cavity margins should have been formed on the dotted line *c*, *c*. These lines are supposed to carry the enamel margin far enough around the labial and lingual angles to render them self-cleaning, while the gingival enamel margin passing the proximation is protected by the gum septum. Unless the extension of caries has been such as to require it, it is generally not necessary to carry the cutting so far around the labial angles as to render fillings unsightly (see Figs. 27 and 28). A careful study of primary decay of the enamel, or corrosion of its surface, in teeth that have had reasonably good care will show bright enamel at the point of rounding onto the labial angle. Therefore there is generally no necessity for great extension for prevention in this direction. However, cases are not infrequently met with, especially in thick-necked teeth, in which corrosive agents extend their action considerably around the labial angle. This is more marked near the line of the gum margin. These marks of corrosion should not be polished away with the disk or tapes to save the appearance of the tooth by lessening the area of the filling, but in all cases should be cut away and included within the enamel margins. If this is not done it will usually serve as a point of recurrence of decay within a few years. There is often a line of corrosion leading around toward the labial surface near the free margin of the gum which should have especial attention in determining the line of the enamel margin. The proper treatment of this often requires the extension of a considerable angle in this direction. In such cases it is not necessary to extend the enamel margin much beyond the line of corrosion in the direction away from the gum margin, but sufficient extension should be made to the parts at present covered by the gum margin to provide against the exposure of that portion of the line of enamel margin by future recession of the gum.

In my observation of the practice of other operators (and in my own formerly) I have found it quite common to round the enamel margin toward the gingival border much as represented in Fig. 26. The point of penetration in these cases being near the contact point, the tendency of the spread of caries of the dentine and the undermining of the enamel is much more toward the gingival line than toward the cutting-edge; producing a rounded cavity when the decayed portion of the dentine and unsupported enamel is removed. Therefore if no extension for prevention is made toward the labio-gingival and linguo-gingival angles, the cavity will be much rounded in its gingival portion. From the number of cases presenting for refilling in which the lines of enamel margins have been left in this shape, I must think the practice very general. In these cases recurrence of decay is generally seen at the points marked *f*, *f*, in Fig. 26. This seems to be because a portion of enamel margin has been left in such a position at these points as to be uncovered by the recession of the gum septum and of too close approach in the proximation to be self-cleaning. I have now in hand a case with recurrence of decay at these points that had been filled by a gentleman of national reputation only two years ago. This point requires that extension for prevention be made at the labio-cervical and linguo-cervical angles as indicated in Fig. 27, instead of leaving the cavity rounded at these points. Generally the line of enamel margin should be made nearly straight from the occlusive portion of the cavity to the gum line, and then join the cervical marginal line by a short rounded curve (see Figs. 27 and 28). Occasionally it is necessary to run this angle of the cavity well around the angle of the tooth to the labial surface; following up a line of previous corrosion. Toward the linguo-cervical angle extension for prevention is required because of probable recession of the gum septum. This should always be carried sufficiently onto the angle of the tooth to render the enamel margin self-cleaning to the point of probable future recession of the gum. It is a mistake to fill very

FIG. 26.

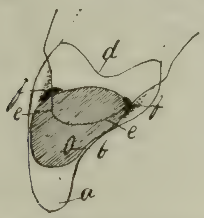


FIG. 27.

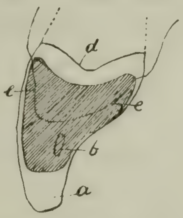


FIG. 26. Proximate surface of an incisor with filling rounded toward the cervical portion of the tooth. *a*, angle; *b*, proximate contact on the filling; *e*, line of the free margin of the gum septum; *d*, gingival line; *f*, *f*, points of recurrence of decay.

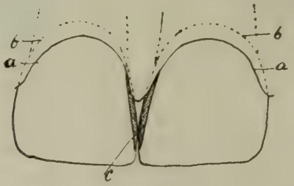
FIG. 27. Filling in proximate surface of an incisor with enamel margins formed on correct lines to prevent recurrence of decay. References the same as in Fig. 26. Compare with Fig. 28.

small cavities in the proximate surfaces of any of the teeth, and none the less in the incisors. It generally means refilling within a few years, for the simple reason that with a slight recession of the gum the enamel margins are in a position to be seriously affected by corrosive agents. For these reasons small or medium cavities occurring in the proximate surfaces of the incisors should be cut freely toward the gingival line, and broadened into angles labially and lingually to self-cleaning lines. The whole of the gingival enamel margin should be covered by the gum septum, and reasonable provision made for recession of the latter when all is completed.

THE CONTACT POINT.

In the incisors we cannot cut away to the occlusive surface or cutting-edge, as we do with the bicuspids and molars, and make the contact point of the proximation on the gold close to the angle. As the normal contact point is usually near the cutting-edge, especially in the mesial surfaces of teeth with strongly belled crowns, it is sometimes difficult to prevent the line of enamel margin next the cutting-edge from coming on the contact point, or slightly root-wise from it. We have seen that a point slightly root-wise of the contact point is most liable to the beginnings of decay ; and that decay rarely, if ever, occurs between the contact point and the occlusive portion, or cutting-edge, of the tooth. This is a point of frequent recurrence of decay after filling ; and it is important that the enamel margin crossing from labial to lingual near the angle be brought to the occlusive of new contact point made by the form of the finished fillings. In other words, the contact point should be on the filling and removed a little distance root-wise from the occlusive enamel margin.

FIG. 28.



Incisors, showing proximate fillings, the area of which include the whole of the proximate surfaces not self-cleaning, or protected by the gum septum. *c*, contact point on the fillings ; *a*, line of the free margin of the gum ; *b*, dotted line showing the position of the gingival line, or the line of attachment of the soft tissues to the neck of the tooth. Compare with Fig. 27.

This enamel margin is necessarily one of near approach to contact in these teeth, but it should not be a contact, and above all it should not be root-wise from the contact. Taking note of the hint supplied us by the observation of the beginnings of caries in these surfaces, and the fact that decay does not begin on the occlusive side of the contact, we should whenever necessary remove the contact point far enough root-wise from the normal position by so rounding, or bellying out, the filling in finishing that the occlusive line of enamel margin will stand just a little away from a contact and between it and the occlusive angle. This need not be much, for the position is such that even though the space be narrow it is kept clean by the usual uses of the teeth. Sometimes it will be found difficult to do this without doing violence to harmony of form, especially in the mesial surfaces of central incisors with wide interproximate space in which the original contact was close to the cutting-edges. It can, however, generally be done by placing the new contact point well toward the lingual. (See Figs. 27, 28.) In these teeth the initial point of caries has usually been near the contact point and the cavity approaches quite closely the cutting-edge (often dangerously close to the angle of the tooth), so that the new contact point need not be much removed toward the gingivus. In the case of thick-necked teeth the original contact point is often so far from the cutting-edge that there is no difficulty in suitably placing the new point of contact, for usually the cavity may be extended toward the cutting-edge if necessary. Care in the management of the details will prevent the frequent recurrence of decay at this point. Naturally, room must be had for properly forming the surface of the fillings.

When distal cavities are to be filled in either the central or lateral incisors, there is no considerable difficulty in so forming the filling as to make the contact in correct form. Considerable bellying out of the distal side of the tooth will not do violence to harmony of form if neatly done.

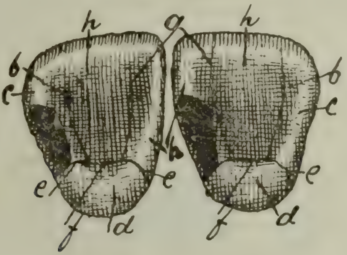
WHICH?

To many in the profession the question will recur as to the propriety of so much cutting in cases of rather slight caries of the upper incisors. Many of these cavities are presented for filling when very small, and the enamel is bright and perfect except a slight corrosion confined to the immediate neighborhood of the point of penetration. These cases are fairly represented in Figs. 22 and 23. In such cases it is the custom of good operators to cut the cavities somewhat as represented in Fig. 24, or even to a less extent, and fill. In these cases the contact point is, or should be, made on the filling and removed a little farther than normal from the cutting-edge of the tooth, in order to avoid cutting too near the angle. In a goodly number of cases these fillings do well for some years, but in the majority of that class of cases in which the tendency to caries is strong, the recession of the line of the free margin of the gum exposes more surface to especial liability to caries, and we find recurrence of decay at the points marked *f*, *f*, in Fig. 24. Observation of such fillings made by operators of known ability, and in which the mechanical performance has apparently been of the first order, has convinced me that the fault does not always lie in the mechanical execution. The fillings have been good mechanically, but they have been made without reference to the changes of the gum margin which occur with the advancing age of the patient ; or without extension for prevention. The result is not properly failure of the filling. It is failure of the tissue which has been left exposed, or has, by changes in the gum margin, become exposed to especial liability to caries. The failure is in the want of adaptation to future conditions. Therefore the fillings must either be patched out at the points designated, or better, removed entire and new fillings made. Now, which plan should be chosen, the extension for prevention in the first instance, or the refilling? Or have we at present such a knowledge of what the future of this or that patient will bring in the way of extension of caries as will serve us in determining that for this patient extension for prevention will be unnecessary, while it will be necessary for that? Possibly something may be done in this line of prognosis, but it must, at best, be very unreliable until many years more have been given to the study of this subject. Therefore we must elect to follow the course of extension for prevention, or be prepared to refill a large proportion of this class of cavities. A careful study of the conditions presented in these cases at the chair by my own patients from year to year, and the observation of this class of fillings from the hands of the best operators, has forced me to this conclusion. And my experience in making extension at the time of the first filling to meet the conditions that will almost inevitably occur has led me to a general adoption of that plan. Still cases are presented, particularly in patients twenty-five years old, or older, in which I have a feeling that the change in conditions will be very slight, and, to some extent, may be ignored. Every case must be treated on its own account, and demands close consideration as to what the future may be, always with a careful study of the conditions which have favored the primary caries of the enamel and with the best prognosis of the conditions liable to arise favorable to its recurrence. It is not a question of caries of dentine. Dentine will decay if we have the primary caries of enamel penetrating to it, and whether it be slow or rapid is of but slight account. In either case it will destroy the tooth sooner or later. The question which confronts us is, first, how to close a cavity perfectly, and second, how to prevent re-penetration of the enamel of that locality. With these two points accomplished, success is attained. The first is being accomplished by many operators. The second is not yet as far advanced. The first is a mechanical operation. The second requires an accurate knowledge of the cause of caries, and of the conditions under which that cause becomes active ; coupled with close insight into conditions favorable or unfavorable, present and prospective. It is only in recent years that we have known the cause of caries of the teeth ; and therefore it is only now, we might almost say, that we are beginning to be able to apply effectively this knowledge to the prevention of recurrence of caries about our fillings. It is through this line of study and practice that the best progress of the immediate future is promised.

Large Cavities.

We may now turn our attention to the lines best suited for enamel margins in large cavities in the upper incisors. In these the initial penetration has been ordinarily near the labio-lingual center of the proximate surface and near the junction of the incisive and middle third, the particular point varying with the position of the proximate contact, which is much closer to the cutting-edge in bell-crowned teeth than in those with thick necks. The spread of caries in the dentine has usually been primarily in the middle third of the length of the crown, and with a much greater tendency toward the gingival than toward the occlusive portion of the tooth. Therefore many cases are found in which the dentine of the middle third of the tooth has been destroyed to a considerable depth with extension to the lingual and labial surfaces, while sufficient dentine still remains in the incisive third to support the angle of the tooth. In these cases it is a common mistake to attempt to retain enamel on the labial portion of the tooth which has lost a part of its thickness, and much of its strength, from secondary caries of the enamel. Generally there are no grooves in the middle third of the labial surface that weaken the enamel on particular lines. Therefore the cutting in this region is simply for firm enamel.

Fig. 29.



Lingual surfaces of the central incisors. *a*, and *b*, *b*, lingual grooves ; *c*, *c*, distal marginal ridges ; *h*, mesial marginal ridges ; *d*, *d*, lingual ridges ; *e*, *e*, *e*, linguo-gingival grooves ; *f*, *f*, central division of linguo-gingival grooves. In each there is a cavity with margins cut nearly to the lingual grooves. The line of the margins should be on the line of the grooves.

On the lingual surface the case is often different, for in many incisors the lingual grooves (*a* and *b*, *b*, in Fig. 29) form very weak lines in the enamel; and unless the marginal ridges (*c*, *c*) are supported by dentine they should be cut away to the grooves (*a*, *b*), and the line of the enamel margin formed against the enamel of the middle lobe. Less frequently the lines of the linguo-gingival groove (*e*, *e*, *e*) require consideration. When these grooves can be seen at all, they should not be ignored in the preparation of the cavity. They are generally very perfect and the mark is early obliterated by wear, but when this is not the case they are apt to be weak. In this part of the tooth there should not be much unsupported enamel left in any case, and certainly not between the margin and any visible groove. Even in these large cavities it will be found necessary near the gum line on the lingual, in some cases, to make extension for prevention of recurrence of decay. This necessity will be shown by a line of corrosion of the enamel, or probable recession of the gum.

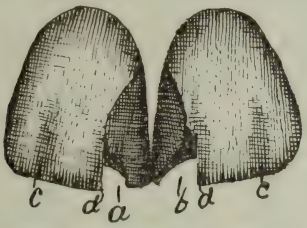
On the labial surface the esthetic requirements demand that all enamel consistent with the safety of the operation be retained. In doing this the judgment of the operator is often taxed to the utmost. It is common in large cavities for portions of the heavy enamel of this surface to be left without support, and if it has not been weakened by secondary caries it may, by careful support, be made to stand for an indefinite time maintaining the good appearance of the tooth. The marginal edge of this should first be trimmed as nearly as possible parallel with the length of the enamel-rods, and then both the outer and inner angles slightly beveled, so that the ends of the rods are cut away. It is a common mistake to bevel the marginal edge of unsupported enamel much to the outside throughout its thickness, in the endeavor to make the filling-material support it from the outside. A bevel sufficient in extent to be distinctly seen and its direction clearly appreciated by the naked eye will give this support as perfectly as a bevel reaching through its thickness, and also give a better form against which to condense the filling-material.

How closely the angle of the tooth may be approached and yet remain strong enough to stand, is often a serious question. The loss of the angle of the tooth mars its appearance much more than the loss of a similar amount of enamel elsewhere. In judging of the strength of an undermined angle of an incisor, the most important question is the depth of the decay mesio-distally or disto-mesially, as the case may be. If this extend through to the middle lobe and the angle is not fairly supported by dentine, it cannot be trusted.

But if the undermining is of less extent than this, so as to prevent the angle splitting off at the groove between the lobes, as shown in Fig. 30, the angle will generally stand if properly supported; provided the enamel is entire. The enamel forming the angle is much stronger than that of any other portion of the tooth ; seemingly, because of the intimate interwining of the enamel-rods in this portion, which is one of nature's devices for giving it greater strength. But even here the greatest resistance to cleavage is in the inner half of the enamel, and if this portion has been weakened by secondary caries it should not be expected to stand much strain.

In the middle lobe the enamel splits away very readily. There is here a different form of cleavage from that discussed in my paper in the January COSMOS. This cleavage is parallel with the length of the enamel-rods, it is true. But there is also definite cleavage in the line of the length of the tooth ; making it quite easy to split the enamel of the middle lobe in a straight line through the entire length of the crown. Therefore if the decay has been such as to allow of cleavage within the middle lobe, or along the grooves by which it is connected with the mesial or distal lobes, the angle should be cut away at once. This I have illustrated in Fig. 30 from a case which was presented to me for repair some time ago. This had been a most excellent piece of work from the mechanical stand-point ; but it was bad judgment to retain the angles, or any portion of them, when the cutting at the junction of the middle and occlusive third of the length of the crown had been carried to the middle lobes of the teeth. Had the angles been removed to the weak point, the grooves crossing the edges of the teeth, and the cutting-edges beveled slightly toward the middle lobes, the fillings would have endured all reasonable strain.

FIG. 30.



Central incisors with angles broken away after filling. At *a*, a portion of the angle had been retained, while at *b* all of the angle had been retained. *c*, *c*, distal grooves ; *d*, *d*, mesial grooves at which the enamel has been split away.

Perhaps I have now gone far enough for the illustration of the placement of enamel margins, though the presentation is not by any means complete. The reasons for these rules will, however, probably appear with sufficient clearness to the thoughtful reader ; and he will be enabled to apply them in localities that have not been mentioned. Their successful application demands of the operator careful study of the structure of the enamel of all parts of the human teeth, in order that he may know where it is strong, and where it is weak, at a glance.

He should not be easily deceived by the slight appearance of grooves after partial obliteration by wear. It should always be remembered that if there are fissures appearing here and there, or if there are deep sulci between prominent cusps, the enamel is generally not strong on the lines of the developmental grooves, no matter how perfect the appearance.

Extension for prevention is based on the well-known fact that caries does not begin on self-cleaning surfaces, nor beneath a healthy free margin of the gum, but is always liable to occur on exposed surfaces that approach each other so closely as to prevent self-cleaning. These places are where *débris* lodges and undergoes acid fermentation. Therefore to attain the highest probability of durability of fillings, surfaces of near proximate approach and not covered by the gum septum should be removed and the area included within the lines of the enamel margin. Furthermore, areas and lines of corrosion of the enamel point out with unerring certainty areas and lines of habitual uncleanliness, areas and lines upon which acid fermentation has been in progress. The careful study of these will enable the operator to include such lines and areas within the lines of his enamel margins, and also make such further extension as will place the margins at a safe distance from corrosive agents.

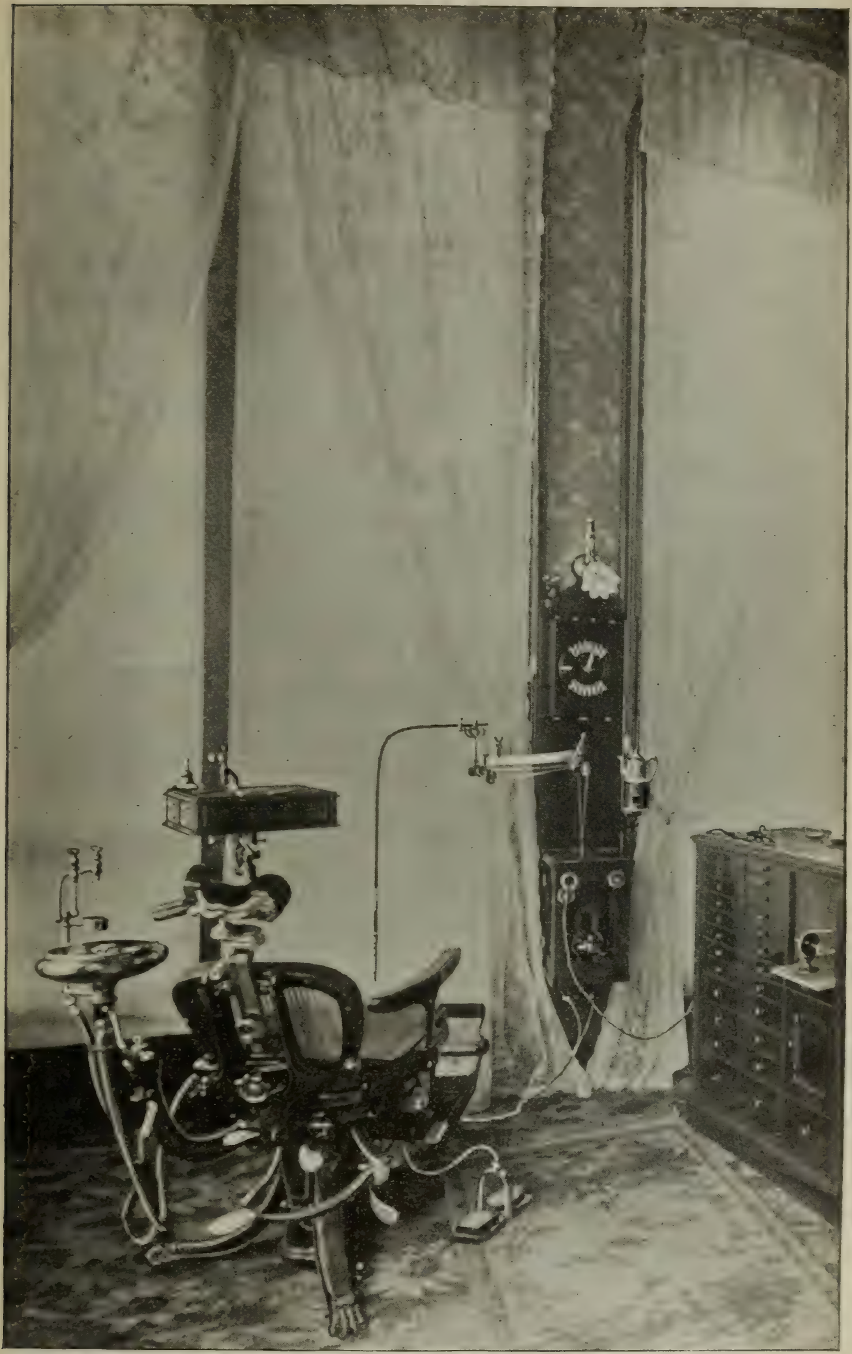
The protection of the integrity and health of the free margin and septum of the gum is also a matter of so much importance to the integrity of the enamel margins that it cannot be too strongly emphasized. Proximate fillings generally will not stand unless the interproximate gum septum be maintained in sufficient fullness to cover the cervical margin, and to the end that this may have more general study I have called attention to it frequently; and also to the necessity of so forming the interproximate contact that food will not leak into the space and break down the gum septum, thus forming a pocket of *débris* to undergo acid fermentation. I ask of the profession a closer consideration of these important points, with a view to the attainment of better results in proximate fillings.

(To be continued.)

THE APPLICATION OF ELECTRICITY IN DENTAL PRACTICE.

BY C. EDMUND KELLS, JR., D.D.S., NEW ORLEANS, LA.

FROM the numerous inquiries received by me relative to the employment of electricity in my office, it is evident that considerable interest exists in dental ranks as to the details of arrangement of what has come to be known as the "Kells Dental Electric System." For the benefit of such inquirers it may be permissible to state that the original object, which was to devise a single reliable and compact apparatus,



The Kells Dental Electric System.

—one which any intelligent operator could understand and use successfully,—has, it is believed, been accomplished.

During the several years of its use the system has been constantly undergoing modifications and improvements. The present apparatus, containing my latest devices, was put up October 1, 1890, and has been in constant use since that date. It requires no more attention than an ordinary foot engine. The cleaning and oiling are done by my assistant.

Formerly, when the mains would become grounded at times, as they are apt to do during wet weather where the street wires are exposed, the use of the mallet would become extremely painful upon certain teeth. I discovered the cause to be the current passing through my hand and thumb to the tooth. This difficulty was overcome by inlaying the plugger at the point of contact with the thumb with hard rubber.

The accompanying illustration represents the arrangement now in daily use in my office. The Edison Electric Light Company furnishes the current, which the system adapts to the dental engine, the electric mallet, the mouth-lamp, and an illuminating office-lamp. The apparatus occupies but a small space, and is really an attractive addition as an office fixture. It will be observed that no wires disfigure the apartment. The motor in its case, engine, shunt-box, resistance wire, and illuminating lamp are all mounted upon a back-board, the wood-work being of polished mahogany and the metal parts nickel-plated. The shunt-box is fitted with an upper and lower set of contacts, each of which varies the current supplied to the switch-bar, which, as shown, is in position to throw in circuit the mallet, which is connected to the flexible cord and lies on the cabinet ready for use. When not needed, the mallet is detached from the cord, which may be automatically drawn into the motor box through a small opening and coiled upon a reel therein. The mouth-lamp may be connected when wanted to the same cord, the proper amount of current for which is supplied by the upper row of contacts.

From a little opening upon the opposite side of the case (shown closed), a similar cord may be drawn which, when dropped into its connections upon the end of the cabinet, furnishes current to the motor which drives the lathe. This lathe and motor are mounted upon a slide which permits the former to be drawn out for use, while at other times it is pushed back, and a little panel door closes it from view and dust.

The lower set of contacts are connected with resistance-coils in such a manner as to give to the motor, through the switch-bar when it is brought under them, certain predetermined speeds, from the slowest which it is considered desirable to use up to the fastest. Within the limits of the motor, these speeds can be varied to almost any extent. For my own use I never desire my engine instrument to revolve less than twenty-five hundred times per minute, and from that speed it is graded up to six thousand, which is the fastest I care for. The engine consists of an S. S. White head and arm, mounted upon a light metal swinging bracket. This bracket is shown at its shortest length, and may be lengthened by simply drawing it out. While the range of extension is seventeen inches, no attention to the belt is required, as in any position it is always taut, being taken care of by two idler pulleys. Provision is also made for taking up the slack of the belt as it stretches. The engine is controlled by the pedal switch and its flexible cord connections, which allow it to be freely moved about by the foot. The object of the stirrup is thus obvious. Pressure upon the heel-plate closes the electrical contact, and the motor at once starts, while breaking of this contact by either the removal of the foot or pressure upon the toe brings into action an improved automatic brake, which instantly stops the bit, while at the same time the current is cut off from the motor. By the term *instantly* I mean the one three-thousandth part of a minute. This is not a mere guess, or an estimate, but may be shown to be the correct time by a little self-recording instrument devised by me for that purpose, and shown in operation at the Atlanta meeting last summer. The advantage of this absolute control of the engine-bit will be readily appreciated.

A marked feature of this system lies in the fact that it is impossible to improperly connect any instrument, thereby rendering it liable to damage from too heavy a current, through carelessness or neglect.

Another very important and recent improvement consists in the arrangement which renders it necessary to close the contact of the pedal switch before either the engine, mallet, or lamp can receive any current. No current is on any instrument or any of the resistance wires until this contact is closed.

Many of the inquiries received relate to the question of safety in the use of the electric current. I have learned from actual experience the necessary precautions against danger to be taken in handling the Edison or similar currents, and I firmly believe that with the apparatus herein described there can be no danger to the patient or operator. Of course, in the laying of the wires through the apartments the greatest precaution should be taken, and only the very best material and workmanship be allowed. At the nearest accessible point to the entrance of the wires from the street a double-pole switch should be placed, and at night this should always be turned so as to cut off the current entirely.

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, March 10, 1891, at the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. W. C. Deane, of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, Broadway and Ninth street. The number in attendance was about eighty. . . . Dr. George S. Allan, of New York, filled a left inferior first molar with gold, using in its preparation the electric motor, and in filling the electric mallet. The tooth was very badly decayed and pitted on the entire crown and on a portion of the buccal posterior surface and lingual wall, and the cavity was a difficult one to fill. The excavation was done with the Weber engine propelled by a C. N. C. motor attachment, the power being supplied from an Edison street current. The first portion of the filling was inserted by hand-pressure, and the remainder by means of the Perry-Bonwill mallet attached to the Weber engine. Globe foil was used throughout the entire operation, to the amount of nearly an eighth of an ounce. The time employed in filling was two hours and twenty minutes. The filling was examined by those present, who pronounced it a specimen of high artistic skill. . . . Dr. C. M. Richmond, of New York, filled a right inferior six-year-old molar for Mr. Charles M. Kaeppel, demonstrating the use of a new hot-air obtunder, the parts of which consisted of an air-pump and small spray apparatus, containing a hollow perforated tube into which is inserted a pellet of cotton saturated with a solution of carbolic acid, oil of cloves, cinnamon, and wintergreen, equal parts of each; after applying the rubber-dam (which should always be used where this method is employed), a spray was thrown into the cavity with excellent results. Before using the apparatus, the end being made of platinum is heated over a Bunsen burner, and then by means of the pump air is driven through the saturated cotton; it in turn coming in contact with the heated tube volatilizes thereby, sending forth a spray of hot air more or less saturated with the liquid contained in the crib-like cavity in the center of the spray apparatus. He also operated for Dr. C. B. Baker, of Bridgeport, Conn., using the same apparatus with like results. The operation consisted of filling two inferior molars, each having extra sensitive cavities on the approximal surfaces. The material used for filling in both cases was a combination of aluminum, tin, silver, and bismuth. The amalgam was inserted in small pieces which had already been amalgamated, and were again softened and burnished into the teeth by means of instruments heated over a Bunsen burner. . . . Dr. Richmond also exhibited a new form of sand-paper disk-holder, consisting of an ordinary mandrel having a flat circular table onto which are fastened two pin-heads, these in turn fitting into two slots punched into the paper disk, and holding the same in a firm manner. . . . Dr. J. A. Kimball exhibited a device for protecting the lower lip of the patient while operating. It consists of a suitably shaped strip of German-silver plate, bent to form, when placed in position, an inverted letter L. A soft-rubber pad is held within the bent portion, which is detachable, and is intended to rest upon the teeth to render the device more comfortable and secure. A loop of braid is attached to the lower end, by which the patient can hold the appliance firmly in place. Though mainly designed to protect the patient's lip, this device also protects the fingers of the dentist from the cutting-edges of the lower teeth, assists in keeping the mouth open, and may partially distract the mind of the patient from the operation. . . . Dr. Kimball also exhibited a combined stand and slab to use in mixing zinc cements. The stand is of metal, and extra heavy to prevent displacement and permit the mixing to be done with one hand. The slab is of glass, and provided with a stem upon the under surface, which fits into an oblong opening in the center of the stand. When the cement is ready for inserting, the slab may be lifted from the stand and held in the left hand of the operator while transferring the plastic material to the cavity. . . . Dr. Rynear, of New York, showed numerous gold crowns and three pairs of pliers, suitable for crown- and bridge-work, of his invention; also two pairs of pliers devised by Dr. Reynolds, of Oil City, Pa. . . . Messrs. W. H. Schieffelin & Co., of New York, exhibited and distributed samples and pamphlets of the new iodine compound, "aristol." Dr. W. C. Deane says of it, "I find its action is similar to that of iodoform, only much more pleasant to use, being safer than the bichloride solution, and less irritating than the carbolic acid. I have used a preparation of one part aristol to three parts lanoline for treating pulpless teeth, this combination forming a paste sufficiently firm to be readily introduced into the root-canals. I have also employed aristol in a solution of sulphuric ether for treating chronic abscesses having fistulous openings, with the most gratifying results. Having obtained not long since samples of aristol, and being desirous of testing its efficacy, I had samples placed in the hands of several fellow-practitioners, with a view of having them give it a thorough test, and report upon it favorably or otherwise.

with the following results: Dr. Bödecker writes, 'I have used the samples of aristol sent me. It appears that its action is about the same as that of iodoform, without the disagreeable properties of the latter. I have found it valuable in cases of pulpitis, also for the treatment of roots, when used in a solution of sulphuric ether. I have also employed aristol in the form of powder in cases of necrosis and antrum affections, with satisfactory results.' Dr. Gottschaldt states, 'I made a solution of aristol in ether, and used it in a case of chronic abscess with fistulous opening, also used it in pulpless teeth for disinfecting canals. I was very much pleased with the results obtained in both cases, finding it answering every purpose in place of iodoform, carbolic acid and glycerin, etc. Furthermore, it is free from the objectionable odor of iodoform, which fact is very gratifying to both operator and patient.' Dr. Chicherio is very much pleased with results obtained from the use of aristol in his work at the New York College of Dentistry, and writes that he is using it in solution of sulphuric ether as an antiseptic for treatment of pulpless teeth, also for chronic alveolar abscess. It seems to have all the properties of iodoform, without the disagreeable odor."

The President. As there are no remarks under "Incidents of Office Practice," we will listen to a paper by Dr. S. B. Palmer, of Syracuse, N. Y., entitled—

Zinc Phosphates.

According to history, since the year 1832 to the present time, experiments with various materials combined with phosphoric acid have been made in hopes to discover the ideal filling-material. What is the outcome?

Various preparations sold under the head of oxyphosphates and zinc phosphates; compounds, the nature of which but few seem to understand or know how to use. Some facts have been gathered from empirical practice, and even those are so indiscriminately thrown together that the reader of society reports finds but little reliable scientific knowledge respecting the adaptations of zinc phosphates to the conditions of the teeth. Thus it is often introduced in direct opposition to correct principles. The material will not meet as many conditions for tooth-preservation as amalgam, yet it has its special adaptations, and obeys the conditions for success or failure as truly as other materials, and its ways are worth finding out.

As you will see, we have gathered from the journals a mass of contradications which are in no way creditable to dental science. Conditions are overlooked until the facts are as badly mixed as a printer's pi. You will recognize the following statements as having appeared in dental literature; the authors' names and the journals from which they have been taken are withheld, because we indulge in no controversy and can see truth in opposition. We are here to discuss principles and theories relating to a given subject, and not the men who have offered them. Note the following: "Of all filling-materials zinc phosphates are the most treacherous, unaccountable, and unreliable."—They adhere to and strengthen frail walls.—On the contrary, they lose their adhesion, and by reaction weaken frail walls and allow them to crumble.—In close proximity they devitalize pulps; they cause sensitiveness of dentine under the filling.—It is a good obtunder of sensitive dentine.—It is a good filling for deciduous teeth.

Some one concluded, "since it fails at the cervical border, it would be a poor material to use under thin gold bands beneath the gums." Some claim that the cause of failure is due to defective manipulation; which would be true if decayed matter should be covered and left exposed at the margin. The same plea was persistently made for failures of gold fillings; practice, however, empirically observes principles which secure success, and avoids those leading to failure. So with zinc phosphates, the conditions determine the results. Let us understand what they are.

There was an interesting statement made by the late Father O'Hara on his return from the great council held in Rome, where were assembled delegates from every nation where there existed a Romish Church: "Many were the languages there represented, yet each conversed freely with the other in the Latin tongue." There is no way out of this jargon except as we come to an understanding through science, which is *nature's* fixed language.

Practice recognizes the fact that zinc phosphate fails at the cervical border; not only that the filling fails, but the dentine also in connection with gold and other materials, but itself is most readily attacked at the gum line. Superficial reasons are given, such as concavity produced by the decomposition of the cement and roughened surface of the filling, which retains food that undergoes fermentation, etc., all of which are true and probably satisfying to most practitioners.

If we go back to nature, we may understand that this is but a manifestation of a universal law which will be explained farther on.

This calls to mind a suggestion in some of the journals to this effect: "If cement will not last when put into the cavity of a tooth at the gum line, we should hardly imagine it would last very long when only protected by a thin gold band placed below the gum line where the secretions have continual play at it." This may seem reasonable, but reason is a conclusion not above the intelligence of the one who reasons.

If the above argument was true, crown- and bridge-work would soon come to an end. The band below the gum border is a preventive of dissolution. The gum margin is a line of oxidation, fermentation, and decomposition in the oral cavity. It is the expression of a physical law which was explained in an article entitled "Matter and Force in the Oral Cavity," published in the DENTAL COSMOS, No. 7, July, 1890. As this law relates not only to zinc phosphates, but to all fillings, even to the teeth, I deem it best to state some of the points and facts relating thereto. In reading lengthy articles on the causes of dental caries, and consulting authors on fermentation at the cervical borders, I find all point to a something beyond, which we are groping after. It was not my intention to again introduce this subject; it, however, appears a duty.

Please pardon a seeming departure from the subject by including other filling-materials. We are more in need of fixed principles to guide our operations and make selections from all materials than the mere knowledge of the chemical and physical properties of one compound having only a special adaptation.

The terms oxyphosphate of zinc and zinc phosphate are often used synonymally, while there is this distinction, as given in "Plastics and Plastic Fillings," by J. Foster Flagg: The powder of oxyphosphate of zinc is calcined oxide of zinc, and the fluid glacial phosphoric acid dissolved in water; while zinc phosphate powder is made by treating oxide of zinc with nitric acid, evaporating to dryness, calcining, and pulverizing.

The physical and chemical properties of each are treated at length; numerous tests are given of both powder and fluid, also how to manipulate. This work furnishes full information upon this subject; to quote freely from it would fill our paper to the exclusion of original matter, which may be of more importance than zinc phosphate.

The chemist conducts experiments with acids and alkalies; he analyzes the tooth-structure, and says caries is produced by the action of acids upon the lime constituent of the tooth, and the conclusions are classed as belonging to the "chemical theory." The biologist accepts the facts set forth, and by patient study and experiments with the most powerful glasses sees the acids swarming with micro-organisms, and he tells us that fermentation and fungi are the agents which produce the acid that decalcifies the dentine. His conclusions are grouped under the head of the "germ theory." The electro-chemist builds upon the foundations already laid, and with the galvanometer discovers that difference of potential between elements in the presence of fluids produces acids prior to fermentation of micro-organisms, and this is called the "electro-chemical theory."

Pure science is a unit; these three ways meet at a common center, if followed to the end; thus far, they agree upon an acid basis.

The law of potential is the foundation of the principles of adapting fillings to the conditions of the teeth. Let us prove this :

Electricity is the force and agent with which we have to do, and the laws relating thereto should become a part of dental education in order to obtain the best results. Potential is a word quite distinct from any other term relating to electricity, and will best serve our purpose in explanation of the law we desire to have every dentist understand. We give a definition more to the point than can be found in a dictionary. "Whenever electricity moves, or tends to move from one place to another, there is said to be a *difference of potential* between those two places. The place from which positive electricity tends to move is said to be of a higher potential than the other. A gold filling would be of a higher potential than an amalgam one adjacent to it. If two elements of different potential be connected by a wire or other conductor, electricity will flow from one to the other as long as the potentials continue to differ."

In its widest meaning the term potential must be understood to mean "work to be done." Water confined in a reservoir, far up among the hills, by reason of elevation and gravity would have a storage energy which could be utilized by passing it through wheels and mechanical appliances on its passage to sea-level. When the reservoir runs dry, there is no energy, because the water has found its level. There is no difference in altitude ; the machinery stops until, by rainfall or springs, the storage is replenished. Corresponding to this, a storage battery is a reservoir of electricity of high potential ; a wire conductor from it to the earth, which is zero, or low potential, would be the means of exhausting the battery, as the pipe exhausts the reservoir. By causing the current to pass through motors, tram-cars are propelled ; by forcing the current through air spaces or a poor conductor, like that between two carbon candles, streets are lighted. When the potentials become equal, the current ceases, the cars stop, the light is extinguished. For currents of lower potential the electricity is generated by the action of fluids, generally upon zinc, and the potential obtained is applied to the telegraph, telephone, and other instruments of that nature. Still lower, the same difference or potential manifests itself in the mouth by action of the fluids upon food, decalcified dentine, etc. With this illustrated definition of potential we will make applications to demonstrate the law of composition and decomposition, confined as far as possible to the oral cavity.

The work laid out is to scientifically account for the dissolution of zinc phosphates, the decay of teeth, and the rapid decomposition of food at the cervical border ; why the roots of teeth decay so slowly below the gums ; why implanted, transplanted, and replanted roots decay so quickly ; why the oral teeth may be worn to the gums without pulp-exposure, while the slowest progress of decay will reach the pulp-chamber without an effort of the pulp for self-protection ; why pulp-capping is no more successful ; and why gutta-percha invites calcific deposits in soft dentine, while highly conductive fillings forbid the same. There are laws for the above variances, and the causes are ours for the finding out. We will for a time lay aside the microscope and look at large objects, and take our object-lesson from nature, and by degrees come down to practical business in our special field of labor.

First, we wish to prove that the line at the necks of the teeth and margin of the gums is a line of oxidation and acidity,—that it is a manifestation of a grand universal law of nature.

We are told the first manifestation of force comes from the rays of the sun. As they fall upon this rapidly revolving globe, the effect is like the coil of wire around the magnet ; the magnetic mineral of the globe is polarized,—thus the north and south poles are at different potentials ; at the same time and from the same causes, augmented by friction of rivers, the atmosphere is electrified and so maintained at a higher potential than the earth, as frequent thunderbolts bear witness. Thus we have electricity and magnetism.

But dynamic electricity does not meet the conditions found in the mouth. We must add galvanism and galvanic currents, which represent electricity as generated by chemical action instead of by friction. We now have magnetism and electricity to reduce from manifestations the size of the globe down to the size of a tooth. If we take the thinnest separating file and magnetize it, there is a permanent miniature representation of the earth magnet ; break the file into pieces, which can easily be done, each piece is a perfect magnet ; when pieces are broken shorter than the width of the file, the poles change to the ends of the piece ; put the pieces into a mortar and reduce them to powder, each piece is an independent magnet still. Lay this fact aside for a few minutes, and take up another. The atmosphere and earth are at different potentials ; air is a poor conductor, and thus it is a high potential that forces the thunderbolt through this resistance to the earth ; at the earth surface, between the two potentials, is the line corresponding with the cervical border already mentioned. Take a rod of iron from ten inches to any length above, suspend or hold it upright, and a simple pocket compass will show its polarity. It will be found that the lower end will have the same polarity ; changing the rod does not change the needle, but does change the polarity in the iron. Lay this fact aside. Examine posts which have remained in the ground until badly decayed ; decay will be the deepest at the line between the two potentials, and what are they? Certainly not a dry post. The post is moist as far above the ground as water is drawn up through capillary attraction. It matters not how short the distance; remember the polarity of the short magnets from the broken file; water is a conductor, and acid is the result of electrical decomposition. Take another example, not of a solid like the soil, but a liquid. Examine the rod of zinc in a Leclanche battery. The fluid is alkaline, and affects the zinc but slowly with an open circuit, but with a closed circuit the surface of the fluid becomes polarized and the zinc much reduced in size, for the length between the rise and fall of the fluid. The Buffalo Dental Manufacturing Company have some fine specimens of liquid potentials, where long-used vulcanizers have been sawed into halves from bottom to top; the same condition appears upon the copper shell; the space between high and low water mark is reduced to an unsafe thickness. Examine tin vessels with copper bottoms which are used with water or kept in damp places; the line of oxidation is plainly marked above the copper by corrosion of the exposed iron. Solder of zinc, could it be used, would obviate all the trouble. There are many more illustrations of this law, but we make the application, and say every filling of metal in the mouth is of different potential with decalcified dentine, particles of food, etc.; not only metallic fillings, but any substance extending from the necks of the teeth to the crown or part way.

Wind a band of unwaxed floss silk around an incisor midway of the crown; allow it to remain a long time; all understand that the enamel will be injured the width of the band; all agree that the erosion is in some way the effect of acids. The germ theory informs us that the silk affords lodgment for elements of fermentation and a harbor for micro-organisms or bacteria, which in their growth and multiplication maintain acid in connection with the enamel; hence the effects. This being reasonable and true, is accepted as the whole truth.

This has been discovered by numerous experiments and much labor, and accounts for the conditions described, but furnishes no law or key to meet changes of conditions. The electro-chemical theory teaches that the moment the silk band becomes wet with the secretions of the mouth, that moment there is difference of potentials between the fluid on the outer surface and that of the inner, which rests upon the enamel. To be exact in calculation: One theory delivers the material and commences work some five or six hours before the other; one obtains acid by electrolysis, the other by fermentation. To prove the illustration of the silk band, please return to the figure of the post; wind a band of cloth around a piece of wood above the line of moisture from the ground; should this bandage be kept moist or wet, decay would set in upon the surface under the winding, from the same cause mentioned in connection with the silk. Let us suppose that the inner surface of the bandage had been well filled with copper filings, there would be no decay. One theory would say the copper destroyed the organisms which was the cause, the other that the copper would impart to the wood the same potential as the inner surface of the bandage. No difference in potential, no current, no decay.

A description of one filling which was done during the time of this writing better illustrates the conditions above mentioned than can be described by any imaginary case. Patient, middle-aged lady ; tooth, right superior first bicuspid with devitalized pulp ; large approximal cavity extending from crown to cervical border ; one-third of the grinding-surface was broken away ; color, a shade darker than belonged to a tooth with devitalized pulp ; filled with zinc phosphate, much decomposed at cervical border, as well as the overhanging enamel, under the remaining cusps. On drilling through, the filling dropped out in two pieces ; no adhesion to the walls. In excavating found that all the dentine forward of the pulp-chamber, at least all that was thin at the time it was filled, was entirely decalcified and softened ; it was that which rendered the tooth dark. The pulp-chamber was filled with gold, as were also presumably the roots. The remaining enamel was beautifully transparent. Here we have a lesson and example that this filling, under these special circumstances, does not adhere to frail walls, neither does it support such.

At the time of first filling, nature made no repairs nor offered resistance to decomposition. The porosity of the structure allowed decalcification to go on in the dentine, and decomposition of the surface of the filling adhering to it ; thus the adhesion was broken up.

It is safe to conclude that decay around fillings is in proportion to the density of the dentine, the same as with gold.

It is not material to cover the fault of careless operations like amalgam containing copper ; it adheres to the surface, but "loses its grip" by back-action decomposition. Having noted the changed conditions through which this tooth had passed, we consider refilling according to the demands under present circumstances. A bicuspid, one-half the crown enamel only, cavity approximal, extending from the center of the crown on the grinding-surface to the cervical border ; amalgam not admissible. The rubber-dam was adjusted, cavity dried and filled about one-third full of zinc phosphate, somewhat thinner mixed than would have been used for the entire filling ; into this, before it had set, a lining of crystal gold was packed ; in a few minutes the projecting portions of cement were cut back of the enamel borders, and the filling finished with crystal gold by hand-pressure. When done, the filling was one of beauty and promise. Here was a case in practice, and one which well illustrates change of conditions and treatment under principles to meet those conditions. When the tooth was first filled with gold, the dentine was not sufficiently dense to prevent secondary decay ; the zinc filling might have answered by renewals, but was allowed to remain too long ; thus the non-adhesion and decalcification. Now the adhesion is perfect, and will so remain as long as the gold protects its margins from decomposition. The gold will stand the abrasion upon the grinding-surface, and I know of no other material that will so effectually strengthen the frail walls as zinc phosphate. The color was restored to perfection.

The above lessons are taken from a tooth with devitalized pulp. Let us next take a case familiar to every operator : A molar in the mouth of a child ; large crown cavity ; large portion of dentine exposed, causing severe pain at times ; on removal of decalcified dentine, find pulp fairly protected ; the enamel borders thick and firm. My own treatment would call for a lining of gutta-percha, a partial filling of zinc phosphate, and finish with amalgam ; but this would spoil our illustration, so we decide to fill at once with the oxyphosphate, with no other guard than oil of cloves or something of that nature to prevent pain for the few minutes required for the cement to set. We should not expect to hear from such an operation short of one or two years, but in time the patient seeks relief from pain in the tooth, and on examination it shows that the filling has worn below the enamel, and dissolution has commenced around the borders in connection with the dentine. Up to this time the action on the filling has been little more than mechanical abrasion. If allowed to continue, chemical action would soon produce the following results, the time varying according to the density of the dentine : Decalcification would destroy adhesion, and thus the filling would be decomposed at all points not in close contact with the walls of the cavity. We need not spend more time in predicting final results. The conditions just related should be a guide to the employment of the cement in deciduous teeth. The density of the structure and the time the tooth is to be retained should decide that question.

It can be used where gutta-percha cannot be made to adhere, and by renewal can preserve deciduous teeth the length of time required. The same rules follow as in adapting fillings to permanent teeth ; amalgam would be preferable to zinc phosphates where it would answer as well, all things considered. As to its adhesion, experiments proved the following : Pieces of ivory cemented upon polished glass dropped off on becoming dry, also when soaked in water, the cause being expansion and contraction. When conditions found in the mouth were complied with, adhesion remained firm : even this observation establishes a fact to the point. On removing a platinum band used in regulating, a thin lamina of cement encircled the tooth, so thin that the enamel was in sight at many points where the metal rested upon the tooth ; the adhesion was firm. I decided to let it remain as an experiment, which was done for several days ; on removal the adhesion was perfect ; this was upon enamel. It is my opinion that zinc phosphate adheres to normal dentine and to enamel until destroyed by decomposition of either the dentine or the cement.

There are many characteristics belonging to this material which might be of interest, but the mention of them would make our paper too lengthy.

It is said that zinc phosphate possesses no antiseptic properties like gold and metals of high potential. It exerts a potent influence in reversing the current of vital potential. Gold produces the acid which does the work by electrolysis, while the acid is present in zinc phosphate in all cases of dissolution of the cement, and in fillings so badly mixed as to allow diluted acid to come in contact with soft dentine. Fillings may produce pain on sensitive dentine by change of polarity, and temperature, also by the acids not neutralized in the process of setting, and soon become normal potentially, as the eating of a lemon may cause sensitiveness of dentine and do no harm, while continued use would work destruction. It is well to guard zinc phosphate with varnish or gutta-percha when used on soft dentine.

As already stated, there is a law of potential which decides our operations in the oral cavity ; when that is recognized and heeded, zinc phosphate will no longer be charged with treachery ; it will be used with discrimination ; its good qualities will be utilized and its bad ones avoided. Not alone does this principle apply to the material under discussion, but to all materials used for that purpose, even to the teeth that require no filling.

Let us start with a well-recognized fact that decomposition and decay in the oral cavity are greatest at the margin of the gums ; this is the manifestation of the law of potential, which I hope to establish in your minds beyond a doubt. With this key and combination I hope some member of the First District Dental Society will be able to pass over into the Promised Land of dental science and tell the profession a secret which our most earnest investigators acknowledge they have not discovered.

We are told the cause of dental caries, the agency of micro-organisms in the mouth, and the germicides which destroy them. We are carried through the process of decalcification of dentine until the vital organic tissue is reached ; beyond this my search for further light from books has been in vain. We are told of people who have been previously healthy, and who in a few weeks' time show a breaking down of the teeth.

We have accounts of patients who on going abroad have like experiences. Neither acids nor bacteria are charged with these sudden changes. Females during gestation and lactation furnish proof of this condition. Have we any satisfactory reasons assigned for these conditions, which cannot be other than a dissolution of a portion of the lime-salts from the organic matter, thus weakening the tissue? Have we been told how this occurs,—the process of absorption of the roots of deciduous teeth, and why implanted, transplanted, and replanted roots become honeycombed and break off? and not less how the incisors which articulate may be worn to the gums without pulp-exposure, while caries reaches the pulp-chamber without calcific protection?

Gentlemen, if you will follow closely for a few minutes, I think we may have a more reasonable theory of vital action and reaction than has yet been given.

The law, as before stated, is the law of potentials. We have traced it through inorganic matter, as in a copper filling changing polarity and thus preventing wood from decay, and see the same principle involved when amalgam fillings containing copper are in contact with decalcified dentine.

Now we may be able to understand that teeth are like posts and trees which stand in the ground; their extremities are at different potentials. Trees are represented by teeth with living pulps; devitalized teeth correspond to posts. Roots of teeth are of the same potential as the whole system, and so are the crowns of teeth with living pulps, while devitalized crowns are of different potential. We fully understand that crowns in this condition decay more readily than vital ones, but on passing the line of potentials at the cervical border decay of the roots is retarded. Thus far the two theories harmonize in the results to a marked degree.

The next step treats of living organs of vitality. This step is not marked out on any survey to the writer's knowledge. An engineer requires a combination of the compass and the telescope in doing his work; the biologist as much needs the galvanometer attachment to the microscope in his work. Let us apply this idea of potential to teeth replanted, or to any tooth returned to the mouth after extracting. As just stated, the root, while firm in the jaw, is in potential with the system; a tooth returned is not; there may be a living attachment upon some portions of the root, but the root itself is foreign, and those portions not in immediate contact are acted upon as the copper acts upon iron, where the tin coating has been destroyed. Nature seems averse to the practice. Let us apply this theory to teeth which by articulation are worn to the gums without pulp-exposure, the pulp-chamber having been filled by secondary dentine. The process of tooth-building is from within after the formation of the enamel ; the internal potential is not changed by the wear, thus nature's process of calcification is not interrupted. As before stated, at the neck of the teeth there is difference of potential which is local. That is caused by the lodgment of food, by fillings, etc., and the action is lateral, not lengthwise of the teeth. I venture to assert that if the teeth mentioned could be as slowly reduced upon the ends by acids instead of by mechanical abrasion, the pulps would not be protected, because acids would reverse the vital currents of nutrition. This, to me, is the reason there are so few exposed pulps saved by capping. To close this line of discussion, please apply the same theory to the absorption of the roots of deciduous teeth, which is a vital process, the working of which is not satisfactorily explained. We must assume that the intelligence which directs the number and size of temporary teeth knows as well when the roots should be taken away to give space for larger organs, but the process seems not to be visible even by the microscope. I will offer my own conclusions, not as facts, but suggestions, that others with better instruments to work with, and promise of more years to work in, may consider the subject, and in time give the profession more reliable information.

Let us get our lesson from physical knowledge. The electroplating bath affords a suggestive lesson. Not to spend time in description, we will say one electrode may be attached to a plate of silver, the other to the article to be plated. Of course the fluid is charged with silver in solution, but the plate is added to maintain the richness of the bath ; the proper current will take from the plate of silver on one side and deposit the silver upon the articles to be plated at the other ; by reversing the current the process is reversed. So we believe that the system is built up by the same process ; vital currents carry through the blood the elements to build up or take down.

The person in perfect health enjoys that blessing, even to the "skin of his teeth." The polarity of the current becomes reversed ; lime-salts are taken from those organs ; they crumble and decay. During gestation we have evidence of this theory. We turn to vegetable life and get the correspondence : a vine is planted by a wall ; it grows and receives nourishment from the soil ; as the foliage increases the demand is increased for more of the lime elements to strengthen the stalk ; the little rootlets find it in the mortar ; lime is extracted ; the mortar crumbles. Each section of the vine sending out rootlets becomes a vine of itself, working under the same law. Do we wish to know how the lime is taken up by the vine, we have only to plant one in a shallow pot with a piece of polished marble in the bottom, using clean sand for soil ; the rootlets pass down through the sand, flatten out upon the marble, and destroy its polish by taking out the lime by acid produced by the difference of potential between the vine and the marble. If there is doubt about the acid, make a chemical test of soil to know that it contains no acid; plant seeds therein which germinate rapidly; test the soil in contact with the roots, and there is proof of the presence of acids caused by the growth of vegetation.

Now we are in possession of four facts relating to the causes of dental caries: First, chemistry teaches that acids dissolve lime-salts; that the growth of vegetation from a tree down to micro-organisms produces acid in the soil in which it grows. Second, the microscope shows life and growth of vegetation of this nature in the mouth. Third, electro-chemistry teaches that acids are a product of electrolysis in the passage of an electrical current from a higher potential to that of a lower. Fourth, by the aid of a galvanometer the difference of potential is made known. All of these conditions are found in connection with dental caries.

Here the three theories harmonize on the causes of decalcification of the inorganic constituents and the dissolution of the organic residue; but we are not satisfied to rest with this knowledge. There are other problems to solve of more vital importance,—vital because the difference between a tooth with a living pulp and one with a devitalized one is not clearly explained.

To the writer the problem is no more difficult of solution, and can be solved by science as conclusively, as the one which has so long puzzled the profession, and recently so ably answered,—Why do teeth decay?

Now let us assume that the pulp and organs of nutrition pertaining to the interior of a tooth are negative, or of alkaline potential; that the enamel and normal dentine, as well as saliva, are of the same potential. So long as this condition should remain, there would be no decay. We understand that acid is of a higher potential than alkali; it is plain that the presence of acid in the saliva would change nature's normal potential; teeth would be affected upon their general surfaces, but more at the cervical border, which is the line of "clash" between high and low potentials. By this we can see that teeth may be worn to the gums without change of potential, while a cavity progressing no faster would expose the pulp at one-half the depth. Sensitiveness in dentine is evidence of change of potential.

What is called "tooth edge" from sour fruit is a manifestation of thermal changes; excavating cavities, and the sensation after filling, are all evidences of potential differences. Should this difference be maintained, nature would make no repairs; once restore equilibrium, the strike is off: nature goes to work.

In potential there is a revelation of natural laws relating to composition and decomposition ; growth and decay of matter through its various changes, from charcoal to diamond, from lichen to trees, from the jelly-fish to the highest type of man.

The energy, under Divine guidance, that does the work, is received in currents from a point of higher potential to one of lower. *Potential* is the combination that will unlock the secret of vital energy, and unfold to our comprehension the potent principles of composition and decomposition, and its relations to life and death, as scientifically as the laws of gravitation express the principles of falling bodies.

Discussion.

Dr. R. Ottolengui. Dr. Palmer spoke of the well-known fact that teeth can be worn away along their cutting-edges until the dentine is well exposed, and until we can see by a little circle where the pulp-chamber had been. He then said he would venture to assert that if a chemical action could be made to act as slowly the pulp would not save itself, but would be reached. I think that the action of abrasion is of this character. In these cases the pulp does protect itself. I understood Dr. Palmer to say that if a slow destruction could be made by an acid, the pulp-chamber could be reached.

Dr. Palmer. I have no evidence of the pulp having protected itself against decay, as we see in case of abrasion. I have seen cavities of decay arrested and filled with calcareous deposits, which was the result of an abnormal condition of the secretions of an alkaline nature. Should such conditions occur, nature would work within and fortify against encroachments of previous decay as readily as against mechanical abrasion. There would be no difference in potentials. The point is this : Acid is of a higher potential than alkali, and if allowed to come in connection with nature's process of nutrition the vital current is reversed, and the work suspended during the time of such reversal, which would account for the conditions just mentioned.

Dr. Ottolengui. When we speak of erosion on the crowns of teeth, I think we approach something which is very difficult to differentiate. When it comes to the face of the tooth it is less difficult, although the element of abrasion from the tooth-brush must be considered. Dr. Kirk's investigations show that if it were attributable to the tooth-brush, the lines would be different from those found. I have seen erosions where the pulp-chamber had been distinctly entered, and where the little circle showing the original walls of the pulp-canal was discernible to the eye, above and below the abrasion, showing that no new dentine had formed there. As evidence of that I would cite a case where, eighteen months ago, a gentleman came in with a set of teeth which had rapidly eroded, so that the faces of seven or eight of the front teeth were badly marred. I gave him a set of test-papers, and instructed him to use them, putting one in his mouth at night and taking it out before cleaning his teeth, one after cleaning his teeth, and one during the day. He brought them to me. Invariably those that had remained all night showed an acid reaction ; the second were slightly tinged, and those used in the daytime remained neutral. I instructed him to use alkaline washes night and morning, and to pack prepared chalk around the necks of the teeth at night. I took a careful impression of the teeth, and he went to Europe. When he returned, there had been no further erosion, or, if so, it had not gone sufficiently deeper for me to detect it, whereas all of the original erosions had occurred during six months. Here was a year and a half, and the alkaline treatment at night had seemingly prevented any further progress of the disease. I argue that this was a slow, acid destruction of the teeth. I have seen some where they have gone into the pulp-chamber, and it has protected itself by filling up with dentine.

Dr. Palmer. If you understood me to say that acid invariably did that, the inference would be that you could not eat a lemon or anything acid without great injury. The dentine might be inflamed, and I can see how this can go on in a slight degree to stimulate the action. Then it might proceed in the same way, and protect itself, provided it did not reach that state of inflammation which would produce suppuration.

Dr. Wm. Carr. I would like to ask whether there is a difference between dead and living teeth.

Dr. Palmer. I will here explain the difference between a vital tooth and one that has the pulp destroyed. Take a piece of iron made in the shape of an incisor. Iron in a normal condition is subject to oxidation. It is acted upon by acids or moisture. If you will drill into the root part of the iron tooth to represent a small cavity, and put in a wire of 'zinc, and call that the living pulp by comparison, we all know that in so doing the potential of the iron has been changed ; it will oxidate less than it did before. The zinc, so to speak, imparts to the iron a vital principle. Form a cavity in the other end of the crown and fill it with gold, and there is still another change. We have introduced an element of a higher potential than iron. The effect of the zinc was to increase the potential of the iron, to raise it above its normal resistance to oxidation. The introduction of the gold has a reverse effect, to lower the resistance of iron. Somewhere between the gold and zinc will be a line of increased oxidation corresponding to the cervical margin of the gums.

Imagine a tooth in the mouth ; pulp devitalized ; decay proceeds to the gums ; there the potential of the fluids changes from positive to negative, or from acid to alkali. If this were not so, the roots of teeth would soon decay; not only roots of devitalized teeth, but roots of teeth in gum pockets one-half or two-thirds their length separate from the gums, which remain sound; we do not look for cavities far beneath the gums. Notice the difference with implanted or transplanted roots: they do not become living organs of the same potential as a root left in by decay. Nature does not adopt life in that way. As said of the vine planted by the wall, the little rootlet goes to work on the mortar. The root of a tooth crumbles away.

Dr. E. A. Bogue. The paper read by Dr. Palmer is of such an entirely different character from what I had supposed, that I do not know what to say. A little article by Thomas Fletcher, that was published in one of Ash's catalogues a year or more ago, struck me so forcibly that I should like to read a few words from it. The heading is, "Translucent Cement Stopping Wanted." He tells what he supposes an ideal filling should be; then he goes on to say, "Since these letters were written, I have retired, beaten, from the contest, in spite of my determination never to leave it until successful. Possibly Mr. Whitehouse, had he not been the model of courtesy, would have said that my failure simply and conclusively proved my own incompetence for the work; but in this case the result proved the incompetence not only of myself, but of two other trained experimental chemists, Dr. Louis Schad, of Berlin, and Mr. W. M. Hutchings, of the School of Mines, both of whom were associated with me for many years in experimental work, so that I failed in very good company. The experiments and the hopes of success gradually narrowed in the course of years to a very small circle, and the last two or three years were devoted exclusively to combinations of phosphates of tin with various compounds of alumina and silica, the last and nearest to success being a pasty neutral phosphate of tin, mixed with a powder containing alumina and silica, with a trace of lime and potash, these being prepared chemically pure, mixed at a clear white heat into a glass, which was ground up to an impalpable powder. This made a cement which resisted all solvents, both acids and alkalies, in precisely the same way as healthy living bone, and offered a greater resistance to all solvents than the enamel of the teeth. It was so close a copy of the natural teeth that it could not be detected, except by the most minute examination. It withstood all tests in natural teeth for long periods, yet it failed signally and totally in the mouth; why, I could never discover, and this failure disheartened me. I still believe that if the filling of the future is ever discovered it will bear a very close resemblance in composition to my last effort, and that this is the direction in which to search."

This brings us back to Dr. Palmer's paper. Possibly Mr. Fletcher may, should he take up those lines, find some new clue to the question which he himself raises. I specially wished to bring this up, because I have heard stated so many times by various professionals that there were oxyphosphates which seemed to be absolutely durable. Not long since a gentleman of New York made some approximal fillings of oxyphosphate. He told his patient that they would last him the rest of his life. I know this gentleman to be so admirable an operator that I was a little surprised to hear this remark. I afterward wedged the teeth apart, and found them all decayed above the fillings, and the fillings at the gum margins badly disintegrated.

Dr. Geo. Evans. A few weeks ago, Dr. Bonwill made the statement that he had discovered the means of entirely preventing the decomposition of oxyphosphate of zinc fillings by thoroughly saturating them with heated paraffine, which melts at a much lower temperature than wax. I have not tested it conclusively, but I think the idea is a very valuable one. I had occasion to put in some of these fillings some time ago, in teeth the pulps of which were very nearly exposed, and I thought it a good opportunity to make a trial of paraffine as suggested. I shall continue the test, and watch carefully the conditions. Dr. Bonwill claimed to get very good results from its use, saying that it renders the surface of the filling and interstices around it impervious to the action of acids.

Dr. S. C. G. Watkins. Dr. Palmer, in his paper, spoke of imperfectly mixed oxyphosphate. I would like to ask him how he would mix it,—whether he would make it stiff enough to handle, or soft enough to flow, or simply have it in that sticky condition between the two.

Dr. Palmer. That question involves so many points, I think it would be very difficult to lay down any rule for its use, because the materials differ so widely; each preparation should have a certain proportion, the same as amalgam, to get the best results from it. I hardly know what rule to give.

Dr. Bogue. I should like to ask Dr. Palmer one more question. Some of us get a little hopeful as we go on, but when we hear, as we have to-night, the theory advanced that the line of the gum is naturally the line of dental decay, and that we must expect the greatest amount of it right there, it makes us sick at heart, unless the doctor can tell us some means of possibly reversing the tendency to destruction there.

Dr. Palmer. Nothing more than to remove the causes, or the conditions which favor the decay, or the lodgment of food that will maintain the acid. I can see the advantage all through of meeting those conditions, and if you will notice the means of prevention is as suggested,—in almost every case alkaline. We hardly use acids in restoring Nature to work. I have been convinced that the process of carrying on the work is of the lower or alkaline potential. You can see that in the formation of shells or in bones or in enamel, or anything of that kind, or in the element of alkali in trees; so whatever destroys that, works adversely and helps to destroy Nature's process. I think we should be very cautious in filling, so that there can be no possible chance for lodgment of food, and thus give a chance for decay.

I did not dwell upon that part because I thought it might not be understood that the gum line is of one potential and the extremity of the tooth the other. I do not mean the enamel, but the fluid or moisture. It was supposed some time ago that because a tooth was a non-conductor it had no polarity or anything of that kind, but we come to know that a piece of lamp-wick saturated with water and suspended has a different potential at one end than at the other. It will take but one simple experiment to prove that the line between the air and water is a line of oxidation.

In experimenting quite recently I took a fine copper wire, made a coil of one end to form a base which supported one inch of the wire upright, placed the coil in a glass, and filled the glass slightly above the end of the upright wire with water slightly acidulated with nitric acid. The action was slight, but apparently alike upon all portions of the submerged copper. In a short time by evaporation of the water the wire protruded and held the fluid, cone-shaped, to the point of the apex,—a circle of verdigris-color covered cone. As evaporation went on, the wire was correspondingly shortened; no portion of it became visible above the point of chemical action.

On motion of Dr. Gibson, a vote of thanks was extended to Dr. Palmer for his very able and scientific paper.

Adjourned.

B. C. NASH, D.D.S., *Secretary.*

MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS.

THE Mississippi Valley Association of Dental Surgeons held its forty-eighth annual session in Cincinnati, Ohio, March 10 to 13, 1891; the president, Dr. M. H. Fletcher, in the chair.

The president delivered a brief address, followed by a paper on arsenic as a dental antiseptic.*

Dr. J. Taft. Arsenic sometimes goes beyond what is desired; not only destroying the pulp but also acting upon the peridental membrane. This is more likely to occur in persons under twenty-five years of age. Some persons are more susceptible to its action than others.

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* This paper appeared in the DENTAL COSMOS for April.

He does not use arsenic very often for the purpose of devitalization, but was not prepared to say that it might not be a valuable root-dressing, and being applied to a tissue already devitalized would not be carried into the circulation. Thus employed, the only manner in which it could produce harm would be if it passed through the apex or the tubuli. It may produce trouble through the continuity of tissue if any pulp remains at the apex of the root. Some cases need antiseptic treatment more than others. The mechanical part of the treatment is very important, and cleanliness is absolutely essential. He could not see why arsenic is any better than bichloride of mercury, and he had used salicylic acid very successfully.

Dr. C. M. Wright. If arsenic destroys bacteria, why will it produce an abscess? He knew an operator in Europe who never uses arsenic unless he wishes to produce a "crop of gum-boils." Why, when applied to a living pulp, will it sometimes produce an abscess? Thinks that if Dr. Fletcher had used any other root-filling he would have had just as good results.

Dr. H. A. Smith. Will there not come a time when the arsenic and chalk may disappear or lose their properties? What is to prevent putrefactive germs from entering such a canal? Professor Mayr says arsenic is not a good antiseptic.

Dr. Frank Hunter. Experiments made upon a bisected pulp have shown the presence of arsenic in the bulbous portion, but none in the roots. Thinks that arsenic destroys by irritation.

Dr. C. P. Gray. The bichloride is to be preferred to arsenic, because it is more soluble and a powerful antiseptic.

Dr. Fletcher. Bichloride being more easily soluble, would pass through the apex more readily. The apex is the point at which to stop. Has never seen an abscess from an application of arsenic to a living pulp. Arsenic is feebly soluble, and would act as a germicide from the infiltration of fluids into the pulp-canal. There is but little anastomosis of the tubuli of the dentine with the canaliculi of the cementum.

Dr. G. S. Junkerman. Arsenic is only an antiseptic when it is in solution; as long as arsenic remains dry there can be no effect from it.

Dr. Taft. Had used cobalt and pulverized charcoal with excellent results. Cobalt is less destructive when mixed with other agents. Arsenic acts differently on different patients. It devitalizes in from two hours to six days. In one case an abscess followed, with loss of the tooth in thirty hours, after the application of arsenic.

Dr. Frank Sage. Glycerin probably aids in conveying the medicament to the apex.

Dr. J. W. Jay delivered an oral address upon "Dentistry Thirty

Years Ago and Now,'' alluding to the many changes in materials and methods during the last three decades, especially in the character of filling-materials. Gold fillings were made formerly mostly of soft gold, and were introduced by hand-pressure.

Dr. James Leslie said the cohesive property of gold was to his definite knowledge discovered in 1839.

Dr. Frank Sage read a paper entitled ''Phagocytosis in Dental Lesions.'' He said it was the object of the paper to review an article on ''Phagocytosis'' by Dr. F. W. Low, and one on ''Mechanism of Infections'' by Dr. Bouchard. Phagocytics is an exhibition of the battle going on between the powers that waste and the forces that tend to prevent waste of tissue. Notwithstanding Dr. Low's admirable experiments and presentation of the subject, he seems to have fallen short of what he attempted. He immersed an upper molar which had been treated by the ''immediate root process'' in agar-agar, and there followed a development of cocci. So that all infected roots probably contain bacteria which are held in abeyance by or destroyed by the phagocytic cells which act as the factors of elimination, devouring all bacteria, both in the pulp-canal and the tissue about the apex of the root.

Dr. Low differs from Dr. Miller in regard to the question of disinfection. Dr. Miller apparently overlooked hot air and mechanical means.

The phagocyte is capable of reaching any point to which the blood has access. It would be interesting to know what takes place at the end of the root which has been filled. In some cases the abscess, if formed, was heroically opened into ; in other cases of abscess the root was filled, with no bad results.

In the light of present researches we can define not only the various pathogenic microbes, but also their several foes lying in wait to guard the tissue against their inroads. We are almost ready to define the hitherto vague terms as diathesis, vital resistance, and *vis medicatrix naturæ*.

We now know what an infected broach may do when forced through an apex, or what a sterilized one may do if it should force any effete matter through the same.

In view of what Dr. Bouchard has to say regarding the phagocyte and the bactericidal condition, it will not be difficult to account for the fact that the infected broach in the hands of the most reckless operator does not invariably excite inflammation. As to what takes place beyond the apex after the roots have been filled, we have been reasoning from effect to cause. We have argued the necessity of stopping the root-canal in order to obliterate any reservoir into which fluids might seep, there to decompose and react upon the parts beyond. This produces a condition which would simply be tolerated, but which might in later years develop into chronic inflammation.

The paper was discussed by Drs. Wright, Jay, Dennis, and others.

Dr. W. B. Ames read the following paper, entitled "Why Copper Amalgam wastes in the Mouth."

Many of us have for several years been endeavoring to attain to some definite knowledge of the physical properties and peculiarities of amalgamated copper. My convictions, derived from an experience of ten years in the use and four years in the manufacture of the material, are somewhat at variance with those of others who have written or spoken on the subject.

The most serious shortcoming that has been urged against copper amalgam as an offset to its many valuable characteristics is the tendency in many cases to waste or cup out, and it has seemed to many to be a sufficiently serious objection to cause its abandonment, or to make it necessary to first make a test filling to discover whether the use of this material would be warranted in the mouth of the patient in hand. My faith in the material has never been shattered, for the reason that, although some of my most conscientious efforts in the making and use of it have resulted in more or less dismal failure, I have had the conviction that the difficulty was to be attributed to faulty processes of making and using rather than to inseparable peculiarities. This conviction was strengthened by having used some time since a quantity of Sullivan's copper amalgam, made for the Dental Manufacturing Company, London, which differs materially from the "Sullivan's" furnished by Ash & Sons. This amalgam I found to stand in mouths in which all other preparations of the kind would waste to a greater or less extent, and it furnished me the incentive to labor toward ascertaining the cause of stability of other copper amalgams. That the wasting was most serious in what is termed acid mouths was not a very tangible clue to start upon, yet it was most natural to consider first what solvents of the constituents of copper amalgam we might naturally have in the mouth. It would be unreasonable to suppose that there was ever a condition of the saliva sufficiently acid to dissolve copper and mercury to the extent that we often see, unless the action was in some way intensified, as these metals are only soluble in powerful acids, unless the less energetic acids be used in connection with a galvanic couplet,—*i.e.*, as the fluid of a battery of which one of these metals is the positive element, or as the electrolyte with one of the metals in question as the anode. In the case of copper there might be a very slight wasting from oxidation and sulphuretting of the surface, the resulting compounds being either dissolved or worn from the surface and continuously re-formed, but in the mercury which is supposed to be presented upon the surface there could be no such wasting, as it does nót oxidize under the conditions present, and the sulphuret, which is the compound formed in the cold state, would form a very tenacious and insoluble film. The black film that the fillings take on which do not show any evidence of wasting is undoubtedly the black sulphuret of mercury, that being the compound that is formed when mercury and sulphur are brought together in the cold state.

The only tangible clue to the solution of copper amalgam in the mouth seemed to be the fact that outside of the mouth the galvanic current would cause the solution of its components in the weak acids and the phenomena observed in the mouth, in the more rapid wasting of those fillings which were so placed as to form the positive element of a battery, the negative element of which was an adjoining or occluding gold filling or crown.

Starting with this as a clue, it was natural to take notice of the fact that many of the copper amalgams, when made at all dry, presented the appearance of being composed of copper amalgam and free copper, the surface showing in some specimens almost a copper-colored surface, and it was most natural to question whether or not this free copper was the positive element and the amalgamated portion the negative element of a galvanic battery when placed in the fluids of some mouths. This would readily account for the entire phenomena, for it would be analogous to the solution of impure, unamalgamated zinc in dilute sulphuric acid where the same zinc with an amalgamated surface is not dissolved. Upon treating amalgams containing free copper with a solution of mercurious nitrate, it was found that the nature of the material was radically changed, a much more thorough amalgamation being brought about, and much better results being obtained with it in the mouth.

Now, what is the cause of this free copper in amalgam? With that of my own manufacture it was largely due to an extensive grinding of the amalgamated copper crystals in a mill devised for the purpose, with a view to giving it a smoothness and a more desirable plasticity. It has been the general opinion, I think, that copper amalgam could not be triturated too extensively by the manufacturer or by the dentist at the time of using. In several published descriptions of the mode of producing the material, great stress has been placed on the heating and rubbing down, and repeating this until sufficient mercury had been worked out and smoothness obtained. On account of results observed in using amalgam made by myself by a large variety of processes, I decided some time since that all or any grinding was injurious to the material, and that the only heat that it should have was that given to it by the dentist at the time of its preparation for the filling. When the amalgamation of the copper is obtained by precipitating it upon the surface of a mass of mercury by the use of electricity, as I originally made the material, the first crystallization takes place with a large surplus of mercury, so that heat is absolutely necessary to put it in marketable condition, and unless the copper has been precipitated in a uniformly fine state the grinding must be resorted to ; whereas, if the copper is precipitated upon some other than a mercury surface, and the amalgamation of a proper quantity effected by the use of proper chemicals, the excess of mercury can be worked out and the material put into marketable condition without heat and without grinding. That heating, and especially repeated heating, is injurious to copper amalgam where the very best results are required, is unquestionable, as the 250° F. that is required to break up the crystals and set mercury free is sufficient to volatilize the mercury to a very appreciable extent, as can be seen by holding a piece of gold over the amalgam during the process. While I do not consider careful heating to be as injurious as the extensive trituration that has been so generally advised, I think that it is well to use only fresh amalgam in such cases, as we have reason to fear that otherwise wasting might take place.

With copper amalgam in which the copper precipitate has been carefully amalgamated, and the amalgamation has not been disturbed by heat or grinding, we have a material that will have permanency and stability in the most acid mouth.

Where a filling has wasted, it has in nearly all cases a surface to which fresh amalgam will readily attach, so that these fillings can be easily made flush ; and if this is done with an amalgam that has the proper stability, the filling is practically as good as if the wasting had not taken place.

Dr. L. E. Custer. The general explanation of the cause of the waste of amalgamated copper fillings has been that it was due to the saliva having an acid reaction. But this is not satisfactory for these reasons : 1. If the saliva is of sufficient acid strength to dissolve the copper or mercury of a copper amalgam filling, it would not only attack the enamel of the teeth, but it would in like manner act upon some of the other metals which compose ordinary alloyed amalgam fillings, some of which are more easily soluble than copper. A common amalgam filling does not disappear from this cause. 2. If copper amalgam fillings are dissolved in the mouth by an acid, they should waste pretty equally all over their surfaces, which in all cases they do not. 3. Some copper amalgam fillings waste, while others in the same mouth do not. This would not occur if the wasting were due to acid saliva. 4. If copper amalgam is susceptible at all to the action of acids as solvents, it should waste between the teeth where acids, the product of fermentation of food-particles, are generated. And finally, copper amalgams sometimes waste in an alkaline saliva as well as in one of acid reaction.

The fact is that saliva of an acid reaction is not the direct cause of the waste of copper amalgam fillings, but it is simply a condition which favors the waste of certain kinds of copper amalgams, such as the first manufactured in this country. That waste of some copper amalgams occurred in an acid saliva is no proof that this fluid is a solvent; but the coincidence leads to the thought that there is in some way the relation of cause and effect.

In order to understand what this relation is we must go down to first principles, as in the paper just read. We must first know what copper amalgam is, what changes it is likely to undergo in the mouth, and under what conditions it would most likely lose substance.

This material consists of copper particles in a fine state of division whose surfaces are more or less amalgamated If this amalgamation is perfect, there will be no copper surface exposed at all; yet if one of these particles be broken in two its whole inside will present a clean copper surface. We must understand that there is no fusion of one metal into the other. In a filling these metals are like the bricks and mortar of a house, the copper particles representing the bricks and the mercury the mortar.

Whether these copper particles are entirely amalgamated or only partially so, is a very important consideration. A second consideration is in regard to the proportion of mercury; there may be simply enough to thoroughly amalgamate the copper particles, or there may be enough to float them about. A third consideration is in regard to the manner in which it is handled by the operator preparatory to filling.

These conditions relate to the material itself. But there are two other factors which come from without that must be considered; these are the saliva and attrition. All these conditions and influences must be borne in mind before we can approach the question aright.

We have been using a great variety of copper amalgams, all of which have given different results. Copper is a metal very difficult to amalgamate, and there are no less than four different methods, each of which produces a different article. Every manufacturer does not extract the same amount of mercury after amalgamation, and every operator manipulates it in a different manner preparatory to filling. The first copper amalgam made in this country was by the mercuric nitrate method, and by precipitating with iron or zinc. This was often contaminated with other metals. It was coarse, not well amalgamated, often contained twice the necessary amount of mercury, and was used without much discretion. No wonder the warning went up from Brooklyn that there would be a great outcry some day. The use of these different materials in the same mouth, or the use of the same material in different mouths, would give different results. To go into the detail of the different materials and the different conditions and influences would require too much time. We may, however, consider the effect of perfect amalgamation and its opposite, and the relative quantity of mercury as to the waste of this material under an alkaline or acid saliva, and the effect of attrition.

A perfectly amalgamated filling presents, as stated in the paper, a pure mercury surface to the action of the saliva and to attrition. Saliva of an alkaline reaction would have no effect upon mercury, neither would it if it were acid of the strength found in the mouth, since mercury is dissolved most easily only by strong nitric acid. The effect of attrition upon such a filling would probably be to dislodge the amalgamated copper particles. But since perfectly amalgamated copper can scarcely be touched by a file, this too must be excluded. Therefore if a perfectly amalgamated copper filling were always to present a clean mercury surface, it would stand in an acid mouth and under attrition. According to the paper, mercury forms a salt in the mouth,—the sulphuret,—which, as Dr. Ames says, is insoluble, so this would not be affected by the saliva ; but if this salt should be easily dislodged there would be a continual re-formation at the expense of the filling, and such a one would waste when exposed to attrition. But, as stated in the paper, this forms a tenacious film. So we must agree with the conclusions arrived at by the author, that a perfectly amalgamated copper filling properly used will not waste. If during the finishing of the filling at the second sitting the unamalgamated centers of the copper particles on the surface of the filling are exposed to an acid saliva, these would probably waste in the galvanic solution, and the process will stop when these are dissolved ; but if in an alkaline saliva salts should form, these would be removed by attrition again and again until all these exposed particles would have been converted into salts and removed.

A poorly amalgamated filling presents copper and mercury areas on the exposed surface of the filling. If the copper has not been fully amalgamated before filling, it is hardly probable that it will become so afterward, so that these two metals will remain separate and subject to the action of the saliva and attrition. On general principles we would exclude an alkaline saliva as having any effect upon copper. But if in an alkaline saliva salts should be formed and these be exposed to attrition, it would depend entirely upon how strongly these are attached, or if in fact they are insoluble, whether the filling would waste or not. The copper salts we know can even be removed with a tooth-brush, so that when such a force as attrition plays upon the filling these salts are sure to be removed, and the repeated loss and re-formation of salts at the expense of the filling accounts for their waste in this position. Then the copper salts, and especially the sulphuret, are soluble in water, so that they may be dissolved as fast as formed.

When we subject a poorly amalgamated filling to an acid saliva, we have a very different result, as we have heard in the paper. While formerly the waste of such a filling was supposed to be due to chemical solution by an acid saliva, Dr. Ames explains it satisfactorily as being due to galvanic solution. It is not necessary to say more than to add what he possibly intentionally omitted, that it is not essential that a fluid be strongly acid to produce galvanism, so a saliva which simply has this reaction is capable of producing the phenomenon. Wherever this local galvanic action is going on, the surfaces are fresh, which accounts for the bright appearance and which led to the former belief that it was chemical rather than galvanic action. In receding positions, if these poorly amalgamated surfaces should become protected by the formation of insoluble salts, the galvanic solution would cease at that point.

The proportion of mercury is an important consideration, and especially where the filling is to be subjected to the force of mastication. When the copper particles touch one another on all sides and the inequalities are filled with mercury, I think we have the best material; and according as the proportion of mercury is increased and the copper particles are separated from one another, will the strength be lessened and it will lose substance when exposed to attrition. The first amalgams made contained a large amount of mercury, and their waste in exposed positions was largely due to this fact.

It would be interesting to go into the therapeutics of the copper and mercury salts. If it is true, as stated in the paper, that those fillings which do not waste form mercury salts, what will become of our beautiful theory of the effect of copper salts unless those of the mercury are soluble, for how can an insoluble salt be antiseptic? All these inquiries would be interesting, but are not in place here.

The practical points to be derived are these: Poorly amalgamated fillings should not be used in acid mouths, nor in alkaline ones when exposed to attrition; but perfectly amalgamated fillings, with no excess of mercury and properly manipulated, may be used in all positions and conditions of saliva and be free from waste.

Dr. J. S. Cassidy. It is not necessary, as stated, that a fluid be strongly acid to produce galvanism; common salt is capable of producing this phenomenon. So that we may have at almost all times a condition of the saliva favoring galvanic action.

Dr. E. G. Betty. Nitrate of mercury triturated with the amalgam will produce better amalgamation. Dr. Callahan says it is best to finish at the first sitting and not touch the filling afterward.

Dr. C. M. Wright. Copper amalgam is the most uncertain of all amalgams. Since there is no doubt that it is antiseptic, it is worthy of close study and improvement.

Dr. J. Taft. I question whether the feeble affinity between the mercury and copper is not the cause of the waste. As stated, the copper is very difficult to amalgamate. The affinity between the mercury and copper must be increased before we can depend upon it. I cannot see any special advantage in it as a filling-material.

Dr. H. A. Smith. This is the most scientific presentation of this subject we have yet had. It seems as though we are beginning to understand this material a little better.

Dr. Ames. The amalgamation is not as feeble as Dr. Taft would represent. These fillings save teeth by forming a perfect stopping rather than by antiseptic effect.

Dr. James Leslie. I have pointed out the instability of amalgams containing mercury. Mercury does not form any chemical union with any metal, unless slightly with silver and gold.

Dr. Eugene S. Talbot read a paper entitled "Scientific Investigation of the Cranium and Jaws."

He said he had briefly sketched a few ideas as they occurred to him in regard to the projected investigation of the jaws of modern and pre-historic skulls, and continued as follows:

At the last meeting of Section VI of the American Dental Association, Dr. J. J. R. Patrick, of Belleville, Ill., was appointed to take direct supervision of the work of the examination of the jaws and teeth of the skulls in the different museums of this country. The association could not have selected a better man. It is quite essential that some one who has had years of practical training, as he has in this particular line of work, should not only supervise, but actually make the examination. From the experience which I have had in the past ten years in making examinations that are not so particular or difficult, I have found it requisite that the work should be done by a man, or a set of men, of experience, who should go through all of the museums and superintend personally all the work,—men whose names connected with any paper would be a guarantee of the accuracy and completeness of the investigation.

I cannot, however, see how it is possible for even one individual to go on with the work until some clear and systematic plan has been devised as a foundation to work upon. This plan cannot be thoroughly laid out by any one or ten individuals, for the reason that no individual is able to grasp all the points that are liable to arise in a complete scientific research. This position is illustrated by remarks made by Dr. Patrick, which show that even he, with his large fund of knowledge and professional experience, is liable to be misled by some personal view in regard to this matter. Among other things, he says on page 70 of the Transactions of the Illinois State Dental Society for 1890, "I received some cuts of the superior maxilla, a full set of teeth, and the writer desired to know the measurement of some of my pre-historic skulls; that is, the transverse diameter of the dental arch in the region of the sixth-year molars. So far as race characteristics are concerned, there can be no object in such an investigation. And so with the depth of the palate, etc.; all these measurements are futile for a number of reasons, which it would be occupying too much time to consider."

Now, while these measurements may not be of any value so far as race characteristics are concerned (which I do not admit), yet it may prove to be as essential that a very accurate measurement should be made across the upper jaw in the region of the first permanent molar as that any other line of examination of the mouth or jaw should be made.

It is possible that Dr. Patrick has certain reasons for thinking that these measurements are not necessary, but it is also possible that some one might reasonably desire these particular measurements in the near future, and find upon examination of the report that they had not been taken, thus necessitating the work of going all over the ground again. This is already apparent in the very laborious and exhaustive report of Dr. Betty. It would seem that after Dr. Patrick has received some suggestions he might properly compare them with his own views, and then publish his chart in the dental journals, inviting criticisms through the journals from the dentists, so that they might be read by all. Such suggestions that appeared to be of value could be added to the chart, and such points as were not of material use discarded. In this manner a comprehensive dental chart may be produced.

All the measurements across the superior maxilla up to the time of Dr. Betty's examination had been made from first molar to first molar. What induced Dr. Betty to make a change, and measure from third molar to third molar, I do not know, yet he may have had good and sufficient reasons for so doing. I shall have occasion to pertinently use the measurement from first molar to first molar in a paper for which I have been collecting material during the past ten years. I had at first congratulated myself that a large expenditure of time and money had been saved by the work already done by Dr. Betty. I now find that unless he can show that his plan of measurement is the better one I must go all over the work again, thus causing considerable annoyance to the officers of the museum. Years ago the late Dr. John Mummery recognized the fact that the only relative parts for indicating the true and accurate development of the jaws were the anterior roots of the first permanent molars, and this is very natural. The first permanent molars are the only teeth that erupt normally and are not influenced by the other teeth. They are the teeth by which most of the work of mastication is accomplished, and, therefore, the jaw is better developed at that point ; the roots of the teeth give very accurate points by which to obtain the diameter of the jaw, while on the other hand the third molars seldom erupt normally ; they are creatures of circumstances, sometimes erupting outside of the alveolar process, sometimes inside, occasionally in the center of the process, being always at the mercy of the second molar teeth. The third molar always erupts after the alveolar process has developed, while the first permanent molar erupts before the development of the alveolar process, and is carried undisturbed laterally with it. Again, the alveolar process at the extremities is always influenced by the surrounding parts, as by the divergence of the third molars in the lower jaw, and the action of the tongue and the cheeks, while the first permanent molars are always held in position by each other. Frequently one wisdom-tooth or both are missing, and in that case it would be impossible to get the measurement. Some one will say this is the case with the first permanent molar ; so it is, but the second molar in that case will answer the purpose if it has moved forward and filled the space made vacant by the extraction of the first permanent molar, when a nearly accurate measurement is as readily obtained,—the buccal roots of this tooth giving the precise diameter of the jaw at the time the measurement is taken. The diameter of the jaw at the location of the second molar, when all are in place, is greater than the diameter at the first permanent molar, so that if the first molar should be removed the second molar coming forward will occupy about the same position in the jaw that the first molar did.

I consider the antero-posterior diameter of the jaws of as much importance as the lateral diameter, provided many cases can be collected so as to obtain an average of the excessive and the arrested developments. The premature extraction of teeth goes far toward interfering with the true character of the jaw. The forward movement of the teeth, as a result of the above-mentioned causes, should, as a matter of record, aid in the determination of race characteristics. Prognathism of either the upper or lower jaw is frequently occasioned by abnormal development of the opposite jaw, a purely local cause. Again, the frequent extraction of the first permanent molar, or the failure of the third molar to erupt, would preclude any attempt on the part of the investigator to make an accurate examination. As Dr. Owen has been able to classify some of the lower animals by the antero-posterior diameter of the jaw, so may we with proper measurement be able to add materially to our knowledge of race variation and characteristics by this means.

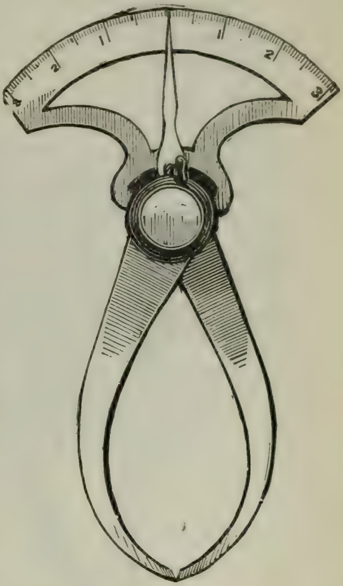
Dr. Patrick says on the same page of the report alluded to, "With regard to measurements of human crania: this has puzzled the brain and ingenuity of physiognomists and craniologists for the last one hundred and fifty years. They have arrived at no reliable data in regard to the relative size of the cranium and face-bones. Measurements of crania amount to comparatively nothing as designating brain capacity or race." I quite agree with the doctor so far as the measurements of the cranium are concerned; but should we as dentists (specialists), who are supposed to be familiar with the bones of the cranium, become so narrow in our investigations as to confine ourselves to the teeth in a scientific study of so much importance as this is? I had always supposed from his writings that Dr. Patrick was a broad-gauged scientific investigator, not only in craniology, but also in osteology, and that he above all others, with his knowledge of craniology, would for his own benefit, if not for the general public, desire to explore the whole field, and show to all scientists that this commission appointed by the representative body of dentists was able to place new facts and new data before the world, so that physiognomists and craniologists the world over could look upon the report of the committee as not only original and admirable, but as containing such a fund of information that scholars of all countries would look upon it as a superior piece of work. That physiognomists and craniologists have not made headway in the past one hundred and fifty years is true; and why have they not made progress? Simply because the indicative points for the measurements were not appropriate to commence with. For instance, take the facial angle. Different authors have had different notions in regard to what should constitute the facial angle. In Camper's angle the facial line is drawn between the most prominent points of the forehead and lower face, and the basal line, from the center of the external auditory meatus, through the anterior nasal spine, to intersect the facial line. In Cuvier's angle the two lines start from the same points to meet at the tip of the incisors; in Cloquet's, at the center of the superior alveolar border; in Jacquart's, at the anterior nasal spine. The Munich-Frankfort angle (adopted at the Craniometrical Congress at Frankfort) includes the facial line between the superciliary depression and the most prominent part of the alveolar border of the superior maxillary, the basal line being the so-called horizontal line drawn between the upper border of the external auditory meatus and the lower border of the orbit. Topinard's angle has a facial line drawn from the superciliary depression to the most prominent part of the lower face, and a basal line in the plane tangent to the occipital condyles and the upper alveolar arch. It will be noticed that most of these authors take for their starting-point the external auditory meatus, drawing a line to the nasal spine; and yet all are at variance in regard to what the other points shall be. It seems never to have occurred to these men that the bones of the body never develop in harmony with the opposite sides, or that the bones of one individual may not develop like those of another individual. I have seen people having one ear or one eye higher than its fellow; others with eyes higher or lower in the head than normal. Others have jaws either anterior or posterior to the normal position. The same is also true of the nasal spine. We frequently observe the nasal bone projecting or receding, relatively to the period of the development and ossification of the bones at the base of the brain. Frequently we see excessive development, and also a want of development, of the superciliary ridges, as well as of the anterior alveolar processes. A line extending two to four inches from any one of these points would necessarily make a great difference in the shape of the calvarium.

It is a singular fact that less is known of the development of the osseous system than of any other part of the human body. In my investigations upon this subject I had occasion to go through the Army Medical Library at Washington, and the only mention of this subject in any language was comprised in twenty-four cases of excessive or arrested development, in connection with patients who were otherwise deformed, and these were only mentioned in a general way. A small work upon this subject has been published lately by Dr. Sutton, an English author. It is very elementary, although exceedingly interesting.

Dr. Patrick furthermore says, "I care not what race of people you might come in contact with, however isolated in any island in the ocean, you could not find eight crania but would be different in shape and size from each other." In this statement Dr. Patrick is quite correct. One of the most complete, scientific, and best-classified museums in Europe is that located at Wiesbaden, Germany. Each room is numbered according to a special period in the world's history, and everything of interest that could be obtained in relation to that particular period has been placed in that room, in the natural position in which it was found. The first room contains relics pertaining to the glacial period and bronze age. Among other things, side by side are two skulls, one brachycephalic, the other dolichocephalic, thus showing that from the earliest man the shapes of the head differed. Pages could be written about these two skulls alone. I have observed that in the brachycephalic skull the upper jaw, like the skull, is always broad, like the jaw of the Chinese, while the dolichocephalic skull has a long, narrow jaw, as observed in the Negro. Notwithstanding all these differences in points of measurements, a great deal has been accomplished by craniologists. There is no class of men so capable of working out a new system of measurements of the skulls, establishing definite points, as dentists, and the present opportunity is one that seldom comes to a man whereby he can make a name for himself. It only requires thought, inventive skill, and well-directed efforts to study out a plan which shall be superior to all others for the accurate measurements of the cranium and jaws.

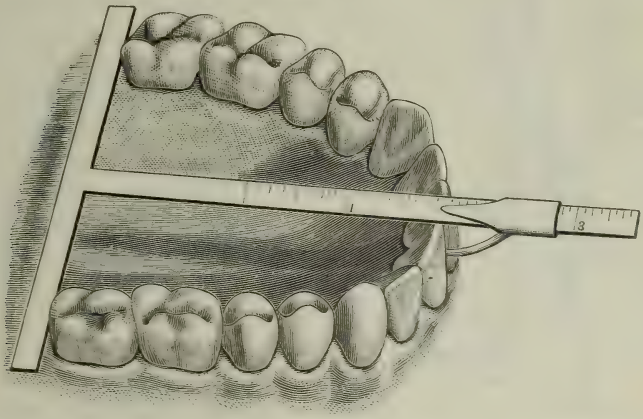
With reference to Dr. Betty's paper I find that Dr. Black, on page 75 of the Transactions of the Illinois State Dental Society, says, "I have not counted the irregularities in the individual skull, but in one hundred and fifty mound-builders there are forty-five cases of irregularity, or thirty per cent. ; in one hundred and forty-five Indians, sixteen cases of irregularity, or eleven per cent." It is essential for us to know whether these cases are the result of local causes, or whether they are of constitutional origin. I have since gone over the tables of Dr. Betty, and have found that only three can be considered constitutional ; that is, irregularity resulting from arrest of development of the jaw. All the others are of local origin. I doubt if there is any other point in the whole investigation that is of more importance to us or to future investigators than the knowledge of facts relative to the excessive or the arrested development of the jaws. We should naturally expect to find more local irregularities of the teeth among early races than among the present people, because at that time the knowledge of the care of the teeth was limited, and the temporary teeth which were allowed to remain in the mouth until forced out by the second set frequently caused the second set to rotate or to be forced out of their normal condition. Another question is as to whether a skull is that of a male or female. Dr. Patrick says, "There is no male or female skull." In this I think he intends to say that it is quite difficult to distinguish the skull of a male from that of a female. That there is quite a difference in size and shape every one will admit. Let me ask, what will the contemplated investigation amount to, if after the committee finishes its examination work it shall be unable to classify the skulls as those of male and female? The influences which produce decay of the teeth are not the same in the male and female. The jaws are smaller in the female than in the male. The diameters of the cranium and the weight of the brain are known to be less in the female than in the male, and I should reasonably and confidently expect to find differences in the shapes of the respective jaws if a close inspection with suitable recorded measurements were made. It is known that the sutures of the skull in the female are more definitive than those of the male. The discovery of any distinctive points in a cranium whereby one can easily determine the sex to which it belonged will certainly add credit to the name of the observer.

FIG. 1.



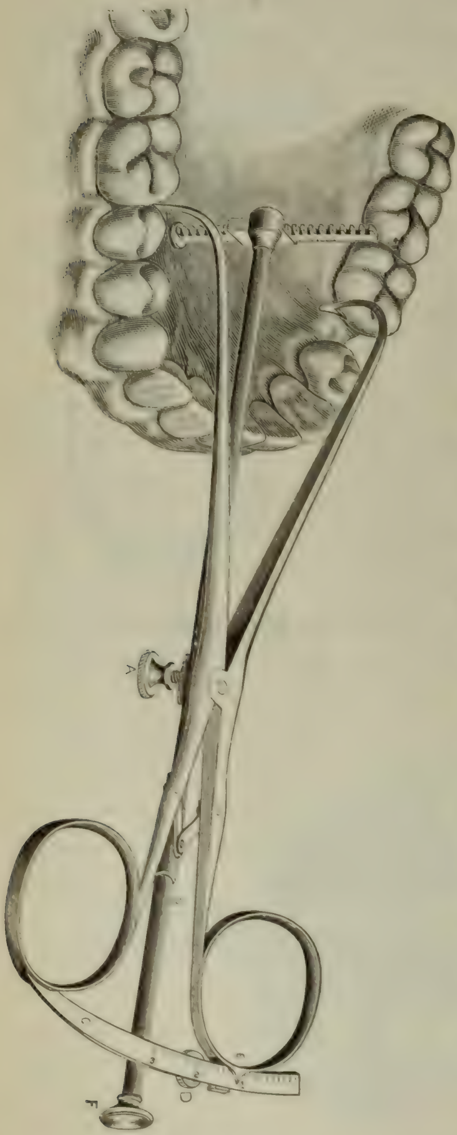
I have thus pointed out some of the work essential to a thorough scientific investigation of the cranium and jaws. This work, however, cannot be accomplished without suitable instruments for the purpose. In my investigations I found that special instruments would be required. For measuring across from the anterior roots of the first permanent molar, and some other measurements, the registering calipers, Fig. 1, consisting of two arms fastened near the center, coming together at the end, while the other ends are so arranged that they register the distance between the two extended points, will be useful. These (preferably the six-inch size) can be obtained at any machine-tool store. Fig. 2 illustrates a T-square having its long arm graduated and provided with a sliding indicator. This I have devised for the purpose of obtaining the distance from the posterior surface of the second or third molar to the mesial

FIG. 2.



surface of the cutting-edge of the central incisor, or the alveolar process, at the median line. In a majority of cases we find that the two halves of the jaw are not uniform. The third molar upon one side may be missing, or one posterior column may have advanced more than the other. In either of these cases an accurate measurement by the ordinary method would be impossible. By placing this instrument upon the skull, model, or into the mouth so that one arm will touch the distal surface of the farthest third molar, and then bringing the long arm onto the median line, and sliding the indicator against the mesial edge of the incisor (or the alveolar point, as the case may be), very accurate measurement may thus be obtained. The respective lengths of the two sides may be likewise measured. The third instrument, Fig. 3, is for the purpose of obtaining the height of the vault from the margin of the alveolar process to the highest portion of the roof of the mouth. This instrument consists of four arms, three horizontal and one perpendicular. Two of the horizontal arms are made like a pair of scissors, while the points are at right angles. When they are opened, the points rest on the alveolar process between the teeth. The third and tubular arm, B, slides lengthwise or rotates adjustably in its guides, and is fixed therein independently of the other arms by the thumb-

Fig. 3.



screw A. At the end of this arm a graduated arm or rack is geared to a shaft within the tube B, and is moved vertically by turning the knob F. The graduated segment C, together with the index E and thumb-screw F, serve for measuring from point to point of the separated arms, by which means the distance between opposite alveolar points may be ascertained whether the teeth be present or absent in either the living or exhumed subject. The distance between opposite teeth from the cuspids back to and including the third molars may be likewise registered. When the instrument is placed upon the jaw, model, or into the roof of the mouth, the arm ends are placed upon the alveolar process, and the vertical rack is carried to the highest part of the vault. Upon examining the rack, upon which a scale is cut, one can easily ascertain the height of the vault. The point at which this measurement should be taken is at the space between the second bicuspids and the first permanent molar, because the vault from between the first permanent molars and posterior to it is not affected by local causes, and is therefore normal. The vault is also highest at this part. Not only may the height of the vault be thus measured, but by successive adjustments of the arm B and its graduated rack the relative conformation of the two sides and in fact every part of the surface included within the dental arch may by this instrument be accurately measured for diagrammatic representation. The last two instruments are of my own design, and are not on the market.

The most accurate method for cranial measurement is that known as the Bertillon method, and is used in France for the purpose of identifying criminals. It is the most perfect measurement which has ever been devised. It is not necessary to enter into a description of this method, as it is familiar to you all. It has been adopted in the penitentiary and police government of this country, with very satisfactory results. The only thing necessary to make it complete for the purpose of scientific investigation is to discover definite points upon the cranium by which to apply this method.

The expense of time and money for this examination will amount to considerable. It will cost no more, however, to make it thorough and scientific than it will to make it narrow and confine it simply to an examination of the teeth. It is high time that the practice of dentistry was lifted out of the narrow rut in which it has traveled and placed upon a broad scientific plane.

Dr. J. J. R. Patrick. The paper just read is more in the nature of a criticism on the investigation that is to be made under the auspices of the American Dental Association than a scientific treatise. As curator of the investigation, he would ask the author of the paper to explain a few paragraphs that appear ambiguous, while others require further elucidation. In the interest of science it seems proper that the essayist should answer the following questions:

(1) Have the advocates of the measurement of the jaws discovered in such measurement anything that will be of service to the profession, or a promise of service?—anything that will prove or disprove theories regarding the development and diseases of the jaws and teeth of the human subject? Have they discovered a cipher by which they can decipher the laws governing variation in animal forms? If they have, it is their first duty to establish the truth of their cipher, and not precipitate a debate on it.

(2) Do the anterior roots of the first permanent molars afford the only true and accurate (measurement) development of the jaws? This inquiry cannot be dismissed by saying that "it is very natural," for it is just as natural that it should not as that it should have been recognized as a fact by Dr. Mummery.

Again, the essayist says, "The first permanent molars are the only teeth that erupt normally." Are we to understand that all the rest of the permanent teeth are erupted contrary to system or law—abnormally? Does the essayist mean what he says when he asserts that the third molar erupts after the alveolar process has developed, while the first permanent molar erupts before the development of the alveolar process? Is the essayist right when he says, "They (the sixth-year molars) are the teeth by which most of the work of mastication is accomplished, and therefore the jaw is better developed at that point"? If the essayist means that the sixth-year molar when retained is longer in use than any other tooth of the permanent series in the human subject, this statement would be correct; but that it is more useful in mastication than any other tooth of the same series would be equivalent to saying that the legs were more useful than the arms, seeing that each tooth has its special use and office.

(3) Where does Dr. Owen say he was "able to classify some of the lower animals by the antero-posterior diameter of the jaw"?

(4) The essayist says, "It is a singular fact that less is known of the osseous system than any other part of the body." Is it possible that anatomists and physiologists have neglected the substructure upon which the superstructure depends? Have original investigators in this line lived and toiled in vain?

The Bertillon method is a method of measuring certain portions of the body of known adult criminals in order that they can be *re-identified*, and not a method of measurement by which the tendencies to criminality may be revealed.

Were mankind organized beings exactly alike, these measurements would be useless. If we compare millions of faces, what two are alike?

Dr. Talbot. This is the kind of discussion I like. Dr. Patrick brought out the very points I wanted. The first molar is the first to erupt, and changes less than any other of its class. The third molar seldom develops normally. The first molar is the only tooth which develops normally. The jaw is growing smaller every day.

Dr. Patrick. The teeth are the most important clue as to the kind of animal. Dr. Betty has done the best work of the kind up to date. The skull of the female has no distinguishing characteristic ; it is always in proportion to the skeleton.

Dr. E. G. Betty replied that since Dr. Patrick was in search of facts he had given some. He undertook this investigation under many difficulties, and his efforts were curtailed by the work done by craniologists employed by the government. Some one had to do this work, and he, while opportunity, time, and means were at hand, undertook it.

Dr. Rickets read a paper entitled "The Surgery of Cleft Palate." He said he would confine his remarks to a few suggestions concerning the buccal and labial regions, especially with reference to restoration by grafting. It is difficult to determine just where the work of the dentist ends and where that of the surgeon begins. He did not think, however, that either would be content to have such work reported in a journal on mechanics.

Any part or all of the hard palate may be wanting, with or without its soft mucous covering. However, as a rule, when the hard palate is absent in part or in toto, the mucous membrane is also wanting ; especially is this so when the perpendicular plate of the ethmoid is absent, which is frequently the case. When the soft part alone is involved, the rent may be in any direction or in any degree, or it may be absent entirely.

Where the deformity of the hard palate is due to injury, the difficulty of restoration is not so great, for the requisite amount of tissue is as a rule present ; and even in many cases of congenital cleft the proper amount of bone-tissue is present, but the edges are inverted so as to pretty well occupy the nasal fossæ. In such a condition that portion of the rolled border may be divided by a saw or forceps, then brought down and sutured in normal proximity by means of silver wire mounted first by a coil and then by a perforated shot well compressed.

The time for operation is of the first importance. Many times the success of the operation depends almost entirely upon the age of the patient. We take it for granted that all the cases due to traumatism should be operated upon immediately, or as soon after the injury as it is possible. In congenital clefts the most desirable time is within the first two weeks,—within the first week, if possible.

Dr. Marcy was the first to make a tracheotomy so that the patient might respire while the oral cavity was closed, so that primary union might be secured in a cleft of the soft parts. Although this proved successful, and the patient recovered with practically a normal palate, the propriety of such a procedure is to be questioned so long as results are secured by other means that answer all practical purposes.

To Thomas H. Manley, more than to any other American, credit is due for carrying into use the suggestions of Maurice Collis, of Dublin. In congenital clefts, Mr. Collis says that the intermaxillary segment may be crowded back into position by fracturing the maxillaries. If the septum refuses to yield, a wedge of it should be removed at the point of juncture of the vomer with the ethmoid. The tuft always contains four teeth, the central and lateral incisors. It is this upon which the shape of the mouth depends. The wide deviation of the opposing jaws would render the remaining teeth useless, so far as mastication is concerned.

By resorting to the foregoing operation not only is the shape of the mouth retained, or rather restored, but the lateral and central incisors are preserved. It may be necessary to chisel away a portion of the adjacent osseous tissues, that close proximity of the parts may be accomplished and union secured. In either event silver wire is indispensable, and should be used with great care. He had made this operation three times, with most gratifying results in two of them; the other failing to unite, sloughed, and was lost. The only modification that he offered is in the plan of making taut the wire, which is done by a simple coil of wire mounted by a shot through which a hole has been drilled.

These clefts present many interesting features. They undoubtedly take place within the first six or eight weeks of fœtal life. Just what the cause is has not been definitely determined.

It is rather remarkable that the majority of the clefts occur in the female, perhaps seventy per cent. of them. Some authors claim that persons having cleft palates are sterile, especially women, and others that men are also; but we have all known women with cleft palates who have become mothers, and we have all known men similarly afflicted whom we had every reason to believe were fathers.

The most common of these deformities are those where the tuft projects, holding one, two, three, or four incisors.

Where the septum extends to the alveolar process, the tuft extending beyond this with one or more incisors, it is almost impossible to save the teeth, especially if the septum is attached at the alveolar process; however, as we are not able always to determine what the result will be, it is our duty to give the subject the benefit of every doubt, but if in a few years these teeth are found to be incapable of satisfactory use they can be removed. The absorption of the process may be partial or complete.

The dentists have been doing such excellent work that we are many times in doubt as to whether or not deformities of the cleft palate should be taken out of their hands. So far as mechanical restoration is concerned, Dr. Grant Mollyneaux, a resident of our city and one of your number, has done good work.

As to the mode of bringing the edges together, whether of the hard or soft tissues, the best appliance that he had seen is the coil prepared by Mr. Armstrong, of Indianapolis, and called the Aveling coil. It is a secret process, and is probably a compound of silver, platinum, and aluminum. It may be allowed to remain in the flesh indefinitely without causing any serious difficulty.

Dr. Wm. Knight. The time of operation is an important consideration. Lesions of traumatic origin of course require the earliest attention. If an operation is required for mal-development, it should be performed in the first week. Operations on syphilitic subjects require very careful consideration. Since the mechanical treatment of these cases has risen to such a state of perfection, surgical interference is not to be resorted to as frequently as formerly. We must take into consideration the effect of resonance and the voice. In nearly all cases the mechanical treatment restores the voice better than an operation does. He would hesitate to operate in most cases, since the operation might not only be a failure but also prevent the use of an obturator when arriving at maturity.

Dr. H. A. Smith. The voice is often lost beyond restoration by an operation. It is therefore best to wait until the patient can wear an obturator.

Dr. G. Mollyneaux. The voice nearly always suffers as the result of an operation; on that account he prefers an obturator in most cases. As to the obturator itself, he prefers the hard instead of the soft rubber for this purpose, and constructs it so as to make use of the impaired muscles of deglutition.

Dr. Patrick. These anomalies occur most frequently in the superior maxilla, because it is made up almost entirely of processes. He had long ago abandoned the soft-rubber for hard-rubber obturators.

The following officers were elected for the ensuing year: L. E. Custer, Dayton, Ohio, president; O. N. Heise, Cincinnati, Ohio, first vice-president; J. Dillon, Bellefontaine, Ohio, second vice-president; H. C. Matlack, Covington, Ky., corresponding secretary; H. T. Smith, Cincinnati, Ohio, recording secretary; F. A. Hunter, Cincinnati, Ohio, treasurer.

VERMONT STATE DENTAL SOCIETY.

THE fifteenth annual meeting of the Vermont State Dental Society was held in Rutland, March 18–20, 1891.

The following were elected officers for the ensuing year: W. S. Curtis, president; G. F. Cheney, first vice-president; A. J. Parker, second vice-president; Thos. Mound, secretary; W. H. Munsell, treasurer; E. O. Blanchard, W. H. Wright, and W. H. Kingsley, executive committee; G. W. Hoffman, State prosecutor.

The next meeting will be held in Burlington, on the third Wednesday in March, 1892.

THOMAS MOUND, *Secretary*, Rutland, Vt.

CHICAGO DENTAL SOCIETY.

AT the annual meeting of the Chicago Dental Society held Tuesday evening, April 7, 1891, the following officers were elected for the ensuing year: D. M. Cattell, president; J. W. Wassall, first vice-president; E. M. S. Fernandez, second vice-president; L. L. Davis, recording secretary; T. L. Gilmer, corresponding secretary; E. D. Swain, treasurer; A. W. Harlan, librarian; J. A. Dunn, G. H. Cushing, E. Noyes, executive committee; B. S. Palmer, G. J. Dennis, R. M. C. Paine, board of censors.

THOS. L. GILMER, *Cor. Sec.*,
3266 Cottage Grove ave., Chicago, Ill.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

THE Alumni Association of the Philadelphia Dental College held its annual meeting and banquet at the Colonnade Hotel, Philadelphia, April 9, 1891. The following officers were elected for the ensuing year: Alonzo Boice, president; James McManus (Hartford, Conn.), D. N. McQuillen, and J. D. Thomas, vice-presidents; J. R. C. Ward, treasurer; L. Ashley Faught, secretary. Executive Committee: J. Lehman Eisenbrey, M. H. Cryer, and F. L. Bassett.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE American Dental Society of Europe will hold its seventeenth annual meeting at Heidelberg on the Neckar, in the beautifully situated Schloss Hotel, on August 3, 4, and 5, 1891.

The officers for the year are: Dr. William R. Patton, president, Cologne; Dr. Isaac B. Davenport, vice-president, Paris; Dr. Charles

H. Adams, treasurer, Frankfort; Dr. Lyman C. Bryan, secretary, Basel; Drs. Patton, Adams, and Wetzel, executive committee; Drs. Davenport, Jenkins, and Prof. Miller, membership committee.

Members of the profession are cordially invited, and are requested to notify the secretary at an early date of their intention to attend the meeting, contribute papers, or demonstrate before the society. Programmes will be issued by June 1, and may be had on application. The charming site of Heidelberg will allow the society to intersperse its three days' proceedings with excursions to interesting points and with visits to the university and the magnificent ruins of the castle.

DR. LYMAN C. BRYAN, *Secretary*, Basel, Switzerland.

JOINT MEETING OF THE PENNSYLVANIA AND NEW JERSEY SOCIETIES.

THE twenty-third annual meeting of the Pennsylvania State Dental Society and the twenty-first annual meeting of the New Jersey State Dental Society will be held in joint session, at Asbury Park, the famous New Jersey watering place, on Thursday and Friday, July 16 and 17, 1891.

The papers will be by the most eminent men in the profession, who are already engaged. A great feature will be made of clinics and exhibits. Due notice of hotel and railroad rates, time-tables, etc., will be given in June.

CHARLES A. MEEKER, D.D.S., *Secretary*,
New Jersey State Dental Society.
H. NEWTON YOUNG, D.D.S., *Corresponding Secretary*,
Pennsylvania State Dental Society.

ILLINOIS STATE DENTAL SOCIETY.

THE annual meeting of the Illinois State Dental Society will be held at Bloomington, May 12, 13, 14, and 15, 1891.

The following papers will be read:

How to Deal with the Condemned Pulp, by Dr. J. T. Dickson.

The Preparation of Teeth for Filling, by Dr. Edmund Noyes.

Prosthetic Dentistry, by Dr. W. T. Magill.

Third Period in the History of Dentistry, continued, with Biographical Notes, by Dr. John J. R. Patrick.

Experimental Studies on the Action of Diffusible Medicinal Agents in Living and Pulpless Teeth, by Dr. A. W. Harlan.

Architecture of the First Upper Molar, by Dr. Alton H. Thompson.

A Lantern View of the Pulp Chambers and Canals, showing Typical Forms and Variations, by Dr. D. M. Cattell.

Efficiency and Simplicity in Regulating Appliances, by Dr. E. H. Angle, illustrated by stereopticon.

Low Fusing Continuous-Gum Body, by Dr. George Cunningham, of Cambridge, England.

Report of Supervisor of Clinics, by Dr. Louis Ottofy.

Clinics.

Dr. W. O. Kulp—Art Technique.

Dr. I. P. Wilson—Root-Filling.

Dr. R. H. Mace—Gold Crown.

Dr. W. H. Taggart—Filling at the Cervical Border ; also, a New Suspension Removable Bridge.

Dr. W. B. Ames will demonstrate Dr. Cunningham's Low Fusing Body for Continuous Gum.

Dr. Edgar Palmer—Administration of Narcotic Vapors, using valved inhalers.

Dr. A. O. Hunt—A New Bridge.

Dr. E. E. Hughes—Gold Inlay.

Dr. Geo. H. Slyfield—Contour Gold Filling.

Dr. K. B. Davis—Artificial Crown.

Dr. T. F. Duncan—Method of Striking up Crown Tips.

All practitioners are cordially invited to attend. The usual reduction in hotel rates and railroad fares will be allowed.

J. W. WASSALL, *Chairman Executive Committee*,
208 Dearborn street, Chicago, Ill.

ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

THE Illinois State Board of Dental Examiners will meet at Bloomington, May 11, 1891, for the examination of candidates for license to practice. Any parties presenting will report to the secretary before 2 P.M. of that day.

C. STODDARD SMITH, *Secretary*,
No. 103 State street, Chicago, Ill.

CONNECTICUT VALLEY DENTAL SOCIETY.

THE twenty-seventh annual meeting of the Connecticut Valley Dental Society will be held at Hotel Hamilton, Holyoke, Mass., on June 10, 11, and 12, 1891. Arrangements already made indicate an interesting and profitable meeting. Special provision will be made for the clinics, which will be under the charge of Dr. L. D. Shepard, of Boston.

GEO. A. MAXFIELD, D.D.S., *Secretary*,
Holyoke, Mass.

COLORADO STATE DENTAL ASSOCIATION.

THE Colorado State Dental Association will hold its next annual session in Denver, June 5, 6, and 7, 1891.

J. H. PARSONS, *Cor. Sec.*, Boulder, Col.

TENNESSEE DENTAL ASSOCIATION.

THE annual meeting of the Tennessee Dental Association will be held at Murfreesboro', Tenn., commencing at 10 o'clock A.M. on Tuesday, July 7, 1891, its sessions to continue for three days.

Many topics of interest will be presented and discussed, including the new dental law. A cordial invitation is extended to all dentists to be present.

P. D. HOUSTON, *Secretary*,
Lewisburg, Tenn.

FLORIDA STATE DENTAL ASSOCIATION.

THE Florida State Dental Association will hold its annual sessions in Jacksonville, on June 2, 3, and 4, 1891. All are invited.

GEO. H. PERINE, *President.*
WM. BAYLOR, *Cor. Sec.*,
St. Augustine, Fla.

TEXAS DENTAL ASSOCIATION.

THE eleventh annual meeting of the Texas Dental Association will be held at Waco, commencing Tuesday, May 26, 1891, and continuing four days. A cordial invitation is extended to the profession to meet with us.

CHAS. B. LEWIS, *Secretary*, Dallas, Tex.

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DENTAL COLLEGE COMMENCEMENTS.

WESTERN DENTAL COLLEGE OF KANSAS CITY.

THE first annual commencement exercises of the Western Dental College of Kansas City were held in the Music Hall, Kansas City, Mo., on Friday, March 13, 1891.

The faculty address was delivered by Professor H. S. Lowry; an address was delivered by Rev. S. S. Laws, and the valedictory by J. H. Cromwell, D.D.S.

The number of matriculates for the session was sixty-two.

The degree of D.D.S. was conferred on the following graduates by Professor D. J. McMillen, dean:

NAME.	STATE.	NAME.	STATE.
S. S. Brown	Missouri.	H. B. Lowry	Ohio.
J. H. Cromwell	Missouri.	Frank Nelson	Kansas.
B. T. Edmiston	Arkansas.	J. D. Roy	Missouri.
H. B. Heckler	Ohio.	C. J. Sawyer	Kansas.
C. W. Lukens	Oregon.		

BALTIMORE COLLEGE OF DENTAL SURGERY.

THE fifty-first annual commencement exercises of the Baltimore College of Dental Surgery were held at Harris's Academy of Music, Baltimore, Md., on Monday evening, March 23, 1891.

The annual oration was delivered by Dr. Wayland Ball, and the valedictory address by Edward Hamm, D.D.S., of the graduating class.

The number of matriculates for the session was two hundred and twenty-four.

The degree of D.D.S. was conferred on the following graduates by Professor M. W. Foster:

NAME.	STATE OR COUNTRY.
David L. Aber	Pennsylvania.
Charles E. Altemus	Pennsylvania.
Louis D. Archinard	Louisiana.
Walter V. Austin	Minnesota.
Theodore A. Bailey	Georgia.
Calvin D. Brown	California.
John H. Bulett	Pennsylvania.
James K. Burgess	Virginia.
James F. Butts	West Virginia.
Joseph J. Battle	North Carolina.
Samuel E. Beecher	Pennsylvania.
Horace I. Beemer	New Jersey.
Ernest Bent	Massachusetts.
Robert C. Bradshaw	Maryland.
John J. Carroll	West Virginia.
Frank M. Conkey	Illinois.
Willard L. Chapin	Pennsylvania.
Calvin O. Chunn	Florida.
L. M. Cleckley	Georgia.
Charles G. Colby	Connecticut.
Thomas A. Cronin	Maryland.
Ulysses A. Dalton	New York.
John W. David	Texas.
Ernest C. Deuel	California.
James F. Downs	Maryland.
William Dick	California.
Edward Eggleston	Virginia.
Josiah G. Fife	Texas.
James G. Findlay	Ontario.
Branch Garner	Louisiana.
James B. Gould	Virginia.
William F. Graham	South Carolina.
Harvey T. Greenlaw	New Brunswick.
Guy Gress	Pennsylvania.
Edward Hamm	Massachusetts.
Lewis A. Hauser	North Carolina.
Samuel J. Heindel	Pennsylvania.
Elmer E. Henry	Pennsylvania.
Robert S. Henry	Maryland.
Frank W. Hill	Iowa.
George H. Jackson	Pennsylvania.
Walter L. Jones	Mississippi.
George Kress	Ohio.
T. B. Leatherbury	Virginia.
Harold S. Lockwood	New York.
John C. Maloney	Virginia.
E. B. Marshall, Jr	Georgia.
G. V. Milholland	Maryland.
Frank S. Morton	Nova Scotia.
James S. McDonald	Pennsylvania.
William E. Nye	California.
Cameron E. Orndorf	Pennsylvania.
Edward B. Parker	Virginia.
Oswald A. Parker	Nova Scotia.
John C. Pfeiffer	Maryland.
Mozart W. Rainold	Louisiana.
Hermann Reichhelm	Germany.
Charles P. Rice	Pennsylvania.
George O. Roberts	Germany.
Fred. C. Royce	New York.
G. P. Schumacker	Massachusetts.
Thomas W. Sharpe	Pennsylvania.
Warren M. Sharp	New Brunswick.
Otis F. Sims	Florida.
W. M. Steinmeyer	South Carolina.
Wm. M. Stewart	New York.
George E. Stoddard	Vermont.
Charles B. Tarr	Maine.
W. E. Teaseley	Virginia.
Thomas K. Tharp	Georgia
Rowland H. Walker	Virginia.
Frederick R. Wilder	Vermont.
Frank C. Wilson	Georgia.
Herrmann Wurzel	Germany.
W. E. Wolfrum	Wisconsin.
Andrew Youngs	New York.

CHICAGO COLLEGE OF DENTAL SURGERY.

THE ninth annual commencement exercises of the Chicago College of Dental Surgery (Dental Department of the Lake Forest University) were held at the Columbia Theater, Chicago, Ill., on Tuesday, March 24, 1891, at 2.30 P.M.

The annual address was delivered by W. C. Roberts, D.D., LL.D., president of the university, and the doctorate address by Calvin S. Case, M.D., D.D.S.

The number of matriculates for the session was three hundred and twenty-three.

The degree of D.D.S. was conferred on the following graduates by Truman W. Brophy, M.D., D.D.S., president of the college :

NAME.	STATE OR COUNTRY.
Charles Gant Adams	Illinois.
Frank C. Allen	Indiana.
Evan Bailey	Illinois.
Claude G. Baker	Illinois.
William H. Balluff	Illinois.
Horace H. Ball	Illinois.
Charles S. Bigelow	Florida.
*F. H. Birchmeier	Illinois.
Charles H. Boughton	Illinois.
David A. Bowerman	Canada.
Raymond W. Boyer	Michigan.
Francis M. Bozer	Indiana.
Clare S. Bradley	Wisconsin.
Oscar F. Brightfield	Pennsylvania.
*John B. Burns	Illinois.
J. W. Cameron, M.D.	Wisconsin.
Frank Chaffee, M.D.	Indiana.
James E. Clark	Iowa.
D. F. Cotterman	Indiana.
George M. Crisup	Illinois.
*Albert M. Davis	Michigan.
Henry F. Dean	Wisconsin.
Fred C. Devendorf	Wisconsin.
Wesley G. De Vore	Illinois.
Willis H. Dwight	Iowa.
David H. Evey	Illinois.
W. H. Fancher, M.D.	Wisconsin.
*Manfred S. Fraser	Colorado.
Donald McK. Gallie	Canada.
Henry I. Gibson	Wisconsin.
Winthrop Girling	Illinois.
Walter J. Godfrey	Illinois.
John Jay Grout	Iowa.
Hans A. Guenther	Illinois.
Joseph E. Hart.	Illinois.
A. A. H. Hamer	Holland.
James E. Harned	Illinois.
George E. Hawkins	Illinois.
George E. Henry	Illinois.
*Charles F. Hunt	Illinois.
Edgar C. Kaye	Illinois.
Edward F. Keefe	Illinois.
Charles G. Keehn	Indiana.
S. De Bruce Knapp	Wisconsin.
*Elmore D. Lyon	Illinois.
James F. Martin	South Dakota.
C. A. McDermand	Canada.
Fred R. McLean	Illinois.
Hugh McNeil	Michigan.
Will F. Michaelis	Illinois.
*Edwin D. Neff	Illinois.
Charles Odell	Illinois.
*Frank A. Paine	Illinois.
Herman G. Pape	Iowa.
John I. Parker	Illinois.
R. McC. Pearce	Illinois.
Stephen C. Pierce	Wisconsin.
Frank J. Powell	Wisconsin.
Ulysses G. Poyer	Illinois.
John H. Ramsey	Pennsylvania.
Edd S. Reed	Illinois.
William A. Reed	Iowa.
*William T. Reeves	Illinois.
*Paul A. Riebe	Wisconsin.
Mervin B. Rimes	Michigan.
Warren M. Ringsdorf	Wisconsin.
Cyrus H. Robinson	Minnesota.
Archer W. Rodman	Wisconsin.
Peter H. Ruus	Illinois.
John M. Saucerman	Illinois.
Philipp J. V. Schnell	Illinois.
Colfax Schuyler	Illinois.
Louis A. Schultz	Illinois.
William H. Simmons	Wisconsin.
Howard T. Smith	Illinois.
Oscar R. Smith	Illinois.
*Frederick A. Stetson	Illinois.
William W. Strayer	Ohio.
*Henry C. Strong	Illinois.
Sherman T. Taylor	Illinois.
*Charles N. Thompson	Illinois.
Peter W. Thorelius	Illinois.
Frank S. Trickey	Illinois.
Wallace E. Tucker	Illinois.
*W. S. Van Nostrand	Illinois.
Patrick H. Welch	Wisconsin.
Adolph A. Wendell	Wisconsin.
Raymond J. Wenker	Wisconsin.
Jarvis W. Wetherbee	Iowa.
Roy P. Wilcox	Illinois.
L. S. Wilson, M.D.	Iowa.
Jonas T. Williams	Iowa.
Frank V. Yorker	Michigan.
Clarence W. Young	Michigan.

*Certificate of honor for having attended a spring course of lectures.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

THE annual commencement exercises of the Royal College of Dental Surgeons of Ontario were held in the Normal School Hall, Toronto, on Tuesday, April 7, 1891, at 8 P.M.

The valedictory was delivered by W. Richardson, L.D.S., and the address to the graduates by J. Taft, M.D., dean of the Dental Department of the University of Michigan.

The number of matriculates for the session was sixty-eight.

The following graduates were admitted Licentiates of Dental Surgery, the certificates being presented by H. T. Wood, M.D.S., president of the board of directors:

H. D. Boyes.
Thos. Coleman.
W. F. Corbett.
O. W. Daly.
S. W. Frith.
C. D. Green.
G. H. Henderson.
J. E. Holmes.
E. R. Howes.
C. W. Lennox, D.D.S.
C. H. Lount.
O. Lillie.
Jas. Letherdale.
G. S. Martin.
A. H. Mabee.
Jas. McBride.
H. S. McLaughlin.
F. R. Porter.
W. Richardson.
J. J. Sinon.
M. J. Sisley.
H. J. Stingle.
H. R. Thornton, D.D.S.
A. T. Watson, D.D.S.
J. E. Wilkinson.
W. R. Winters.
G. F. Wright.

All of the Province of Ontario.

President Wood also conferred the degree of Master of Dental Surgery (M.D.S.) upon—

Thomas Henderson, L.D.S., D.D.S., Toronto.
Orlando H. Zeigler, L.D.S., London.
W. A. Leggo, L.D.S., D.D.S., Ottawa.

EDITORIAL.

THE DUTY OF DENTAL COLLEGES.

ATTENTION was called in the editorial of our April issue to the criticism of a learned professor as to the low standard of graduation in many of the medical colleges of the country, which he attributed chiefly to two causes,—the rivalry of the schools, and the desire to obtain a diploma in the shortest time possible.

That these two elements have worked incalculable mischief in the graduation of unqualified medical and dental students there can be no question. Nor is there yet ground for confidence that the remedy has been, or will in the near future be, applied so as to prevent the graduation of semi-educated men. Nor will the required measures be put in force until the element of rivalry as to numbers is eliminated; until the question of mere material gains to the faculties shall be subordinated to the determination that no man shall henceforth bear the honors of his school who does not measure up to a satisfactory standard,—a standard which should with each year be made more difficult to reach.

It follows, of course, that if the final examination is to be made more stringent, there must of necessity be a sharper discrimination in the outset,—a preliminary examination that will at least determine the probabilities of a successful studentship.

It is not only a blunder but a crime for any college to permit the matriculation of an applicant whose education is so limited as to make it evident that the groundwork for a professional education is lacking. To "pluck" one whose failure is manifestly due to want of application is at best a disagreeable duty, but for a professor to realize that the cause of failure is evidently in the lack of the mental training which should have caused rejection without matriculation must be a strain on the sympathies which no instructor should be called upon to bear.

Clearly no man may reach the upper steps of the ladder who has not trodden the lower rounds. In the nature of things one should not be expected to apprehend scientific teachings unless a preliminary mental development has prepared the way.

To the want of honest dealing on the part of those whose duty it is to stand at the entrance-gates and prevent the admission of the unworthy, is chargeable the recognition by many a poor fellow that after wasting time and money he has mistaken his calling; that he must either seek other employment, or continue a practice for which he recognizes that he is unqualified, and in which his sense of his deficiencies brings him daily mortification.

But it is not alone the semi-educated graduate who has cause of complaint against the ill-judged leniency which permitted his matriculation and graduation; the qualified and conscientious practitioner who finds his calling belittled and disgraced thereby has a just grievance, and as well the unfortunates who find too late that they have failed to profit by the services of an incompetent.

Doubtless many deserving men are led to the thought of dentistry as a pursuit because of the conviction that it affords opportunity for the exercise of the mechanical skill of which they feel themselves possessed. But it is not sufficient that a practitioner of dentistry be possessed of manipulative ability,—be merely an expert operator. He must appreciate structure and function, regional and systemic relations, causes of aberration, and means of restoration to healthy conditions; in a word, he must be grounded in the institutes of medicine and dentistry,—in general principles,—and in the relation of general principles to special practice, and to a rational and scientific procedure in the varied complications which present in practice.

More than this, every graduate in medicine or dentistry should come from his *alma mater* imbued with the scientific spirit, with the ambition and the purpose to keep step with modern investigation, and to do his share toward compelling the recognition and position of the profession of his choice by virtue of intrinsic merit.

The problem before the profession to-day is how to provide a broader culture of its students, and whoever assists in thwarting the efforts of those who are laboring for this advancement deserves to forfeit the respect not alone of his colleagues but of the community.

THE DENTAL PROTECTIVE ASSOCIATION.

THE Dental Protective Association of the United States has issued a circular to the dental profession explaining the purpose and plan of the association, which are in brief to defend its members, without expense to them, when the case is placed in its hands, in any suit brought against them under unjust claims of letters patent owned by any corporation, party, or person. It calls upon every dentist not a member of the association to become so, on or before the 15th day of May, 1891, or be cut off from any opportunity of joining and from any protection in case suit is brought against him under letters patent now in suit in the Supreme Court of the United States. The membership fee is ten dollars, and there are no annual dues. Attention is called in the circular to the manifest injustice of any dentist neglecting to pay ten dollars until he is sued, and then expecting the association to defend him,—an expectation which no intelligent dentist can reasonably indulge.

A BOLD ATTEMPT TO SWINDLE.

WE give the benefit of gratuitous advertisement to the enterprising gentleman whose announcement as below we are credibly informed appeared in Paris and Berlin papers. We are sorry not to be able to give the full name of "Mr. D——," as also that of "Mr. H——," and will thank any one of our foreign subscribers who will furnish us with a copy of the advertisement as it appeared.

The following advertisement was recently sent to the "General Company of Advertisements of Paris," which company refused to accept it:

"To a dentist, or any person who can read and write, and who will send us $75, we will mail, without charge, and by registered package, a diploma of Doctor in Dental Surgery, of *Philadelphia* or of any other similar school of United States of America.

"For further advice write to Mr. D——, Philadelphia, or to his principal agent, Mr. H——, Berlin.

"NOTE. Under no circumstances can parties holding these diplomas, practice in the United States of America, nor in the United Kingdom or its possessions."—*The Journal of Medical Knowledge, Paris, France.*

OBITUARY.

DR. WILLIAM H. ATKINSON.

DIED, at New York City, April 2, 1891, of pneumonia, WILLIAM H. ATKINSON, M.D., D.D.S., in the seventy-seventh year of his age.

Dr. Atkinson was born in Newtown, Bucks Co., Pa., January 23, 1815. He graduated in medicine at the Sterling Medical College, Ohio, in 1847, and received the degree of D.D.S. from the Ohio College of Dental Surgery in 1859. He was married in 1840, at Meadville, Pa., to Martha C. Woodruff. He began the practice of medicine in Meadville in partnership with Dr. William Woodruff, his preceptor and father-in-law, and from thence removed to Norwalk, Ohio, continuing the practice of medicine and surgery. Becoming interested in dental practice, he removed to Cleveland, Ohio, and formed a partnership with Dr. Slawson. Dr. Charles R. Butler was his first dental student, with whom he subsequently formed a partnership. He removed to New York in 1861, and remained in practice there until the close of his life.

Dr. Atkinson was connected as an honorary or active member, or presiding officer, with most of the more important local dental societies; was for a short time professor of the institutes of medicine in the New York College of Dentistry; served as president of the American Dental Association, and was a frequent contributor to the periodical literature of dentistry. For many years he was a prominent figure in the ranks of his profession, bearing the title of "Father" or "Pop" Atkinson, bestowed upon him in affectionate recognition of his readiness to impart instruction to all who desired or needed it. An allusion in dental circles to "the grand old man" was always accepted as referring to him. His heartiness of manner and speech endeared him to his associates; gained the attention and won the regard of those with whom he was brought into fresh contact. He was perhaps more widely known throughout the country as a prominent dentist than any man now living,—his reputation in this respect not being confined to his fellow-practitioners but extending to the general public.

Dr. Atkinson was an excellent operator,—had indeed few equals; was skilled in all the departments of his profession, and was well versed in the pathology and therapeutics of dentistry. He was a fluent talker, an enthusiast in his calling, and desirous of arousing a like enthusiasm in others. He was a dogmatic teacher, and impressed his hearers by his positiveness into acceptance of his theories, but his style of composition was so peculiar, and so marked by a lofty transcendentalism, as to negative to a great extent his usefulness as a writer and speaker.

He was a constant attendant at all dental societies with which he was connected, and a frequent and always a welcome visitor to other dental organizations. He seldom, if ever, attended a dental meeting without being called upon to speak on one or more topics under discussion, and never failed to respond, not infrequently making his extempore contributions the feature of the occasion.

It will, we think, be generally admitted that Dr. Atkinson has done more than any other one man to establish a fraternal feeling among dentists, and to promote in dental organizations the full and free discussion of all matters of professional interest, thus markedly stimulating the professional spirit among the practitioners of dentistry.

The closing years of his life were saddened by the death of his wife and the loss within a short time of two sons who were engaged in dental practice.

He leaves one son, Dr. Charles B. Atkinson, who was associated with him in practice, and five daughters, three of whom married dentists. Another son, Dr. Wm. F. Atkinson, died only three days previous to the death of his father.

Dr. Charles F. Allan, who has been on intimate relations with Dr. Atkinson from boyhood and who doubtless voices the sentiment of a large number of the profession, writes as follows :

"Our dear friend was, in a broad-meaning way, a one-sided man. He loved his profession and his fellow-man, and there was no other side to him. In that 'fulfilling of the law' was the mainspring of all his energy, of everything that made toward his success in life. . . .

"Every dentist thrown into personal relations with him felt the magnetism of his professional love. The energy of strong conviction sometimes gave a seeming asperity to his professional arguments that he was only too glad to smooth over and disavow, as from a personal stand-point, at the first opportunity.

"His residence in New York was a rallying point for the profession from all over the world, and his hospitality, unfortunately perhaps, was unbounded and never limited by his income.

"His professional work and standing and its relative and actual influence with dentists is not within the scope of this brief notice, but probably all will agree that no one man has been a more important factor in the elevation of our profession.

"He was a student all his life. 'Good enough' was never good enough for him if he could do better, and his enthusiasm for good work was apt to prevail with all who were brought within his influence. . . .

"All the members of a great profession will mourn his loss as that of a dear friend and valued mentor."

DR. WILLIAM F. ATKINSON.

DIED, at New York City, March 30, 1891, WILLIAM F. ATKINSON, D.D.S., in the thirty-first year of his age.

Dr. Atkinson was born at Cleveland, O., May 1, 1860, studied dentistry with his father, and graduated at the New York College of Dentistry in 1885. He was married in 1886 to Lita Letson, of Brooklyn, who survives him.

DR. AMBLER TEES.

DIED, at Philadelphia, April 11, 1891, of fatty degeneration of the heart, AMBLER TEES, A.M., D.D.S., in the fifty-fifth year of his age.

Dr. Tees was born in Philadelphia, August 20, 1836. He studied dentistry with Dr. J. G. Ambler, of New York City, and entered practice in New York in 1856, subsequently removing to Philadelphia. He graduated in 1866 at the Philadelphia Dental College. He was a member and secretary of the American Dental Convention and of the Odontographic and Odontological Societies of Pennsylvania. He was married in Philadelphia in 1861 to Mary E. Taxis. He leaves a widow, a daughter, and two sons, both practitioners of dentistry.

Dr. Tees achieved a reputation specially in prosthetic dentistry, and had few superiors in that branch. His continuous-gum work was accounted the equal of the best productions in that class.

Dr. Tees was an upright man, painstaking and conscientious in his profession, and held the confidence and esteem of his fellow-practitioners.

DR. EPHRAIM D. FULLER.

DIED, at Peekskill, N. Y., April 5, 1891, of pneumonia, Dr. EPHRAIM D. FULLER, aged seventy-nine years.

Dr. Fuller was born in Bradford, N. H., July 31, 1812, graduated from the Hopkinton Academy, and was for a time instructor in mathematics at the Peekskill Military Academy. He studied dentistry in Philadelphia, and began practicing in Peekskill in 1844. He was among the organizers of the Hudson River Dental Association, and a member of the American Dental Association. He was a skillful dentist, a man of sterling character, an upright and honored citizen,—an elder for many years in the Presbyterian Church.

He continued the practice of his profession in Peekskill with honor and profit until his death,—a period of nearly fifty years. He leaves a widow and three children.

DENTAL LEGISLATION.

MAINE'S DENTAL LAW.

FOLLOWING is the text of an act to insure the better education of practitioners of dental surgery and to regulate the practice of dentistry in the State of Maine :

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows :

SECTION 1. No person shall practice, attempt to practice, or hold himself out to be a practitioner of dentistry or dental surgery until he or she shall have first received a certificate as hereinafter provided ; and whoever violates the provisions of this section shall be fined not less than twenty-five nor more than one hundred dollars for each offense. This section shall take effect three months after the approval of this act.

SEC. 2. A board of examiners to consist of five dentists of good standing who have been in the practice of dentistry in this State not less than five years, is hereby created. The members of said board shall be appointed by the governor, with advice and consent of council, to hold office for the term of three years and until their successors are qualified, except, however, that the first five members to constitute said board shall be appointed to hold as follows, to wit : two for the term of one year, two for two years, and one for three years. Vacancies in said board at any time occurring shall be filled by the governor in accordance with the provisions of this section.

SEC. 3. Before entering upon their duties the members of said board shall take and subscribe the oaths prescribed by law to be taken by other officers appointed in like manner. As soon as convenient after their appointment the members of said board shall meet and organize by choosing one of their number who shall serve as president and another as secretary for the ensuing year and until their successors are chosen, and shall meet annually thereafter at a time and place to be determined by said board at its previous annual meeting, and may meet at such other times and places as said board may deem necessary. A majority of the members of said board shall constitute a quorum, a true record of whose proceedings shall be kept by the secretary, and shall be open at all reasonable times to public inspection. The secretary, under the direction of the board, shall further keep a register in which shall be entered the name, residence, and place of business of every person authorized under this act to practice dentistry, and shall certify a copy of the same to the Secretary of State, who shall enter the same in a book to be kept for the purpose.

SEC. 4. Every person engaged in the practice of dentistry or dental surgery in this State at the time of approval of this act shall, within three months thereafter, cause his or her name, residence, and place of business to be registered with said board of examiners. The statements of every such person shall be verified under oath before a notary public or justice of the peace in such manner as may be prescribed by the board, and upon due compliance and payment of the fee as provided in Section 7 of this act, shall receive from said board a certificate in due form, signed by the president and attested by the secretary, authorizing such persons to practice dentistry in the State.

Sec. 5. Any person desiring to practice dentistry or dental surgery in this State who is not entitled to register under the preceding section, upon first passing a satisfactory examination before said board, in anatomy, physiology, pathology, therapeutics, chemistry, and the theory and practice of dentistry, and on payment of the fee as provided in Section 7 of this act, shall be entitled to registration and shall receive a certificate as provided in Section 4 of this act.

Sec. 6. The secretary of said board may grant a temporary permit to practice dentistry to any suitable person who shall file with said secretary his application therefor, and shall deposit with him the sum of ten dollars, to be applied toward the payment of said applicant's examination fee. Such permit shall be valid only until the next meeting of said board.

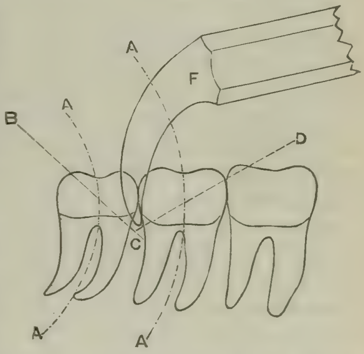
Sec. 7. The board shall receive from the applicant for each certificate issued under Section 4 of this act the sum of one dollar. For the examination of each person under the provisions of Section 5, twenty dollars, which shall in no case be returned, but shall entitle the applicant to another examination without payment of additional fees. The above fees shall be in full for all services and expenses.

Sec. 8. Nothing in this act shall be so construed as to restrict or interfere with physicians and surgeons in the discharge of their professional duties, or with any citizen in the extraction of teeth in cases of emergency.

Approved March 4, 1891.

HINTS AND QUERIES.

A Method of Extracting Lower Third Molars.—In many cases of lower third molars requiring extraction, it is found hardly possible to apply the forceps in the usual direct manner, the teeth being either too much decayed or insufficiently exposed. A method of extraction that appears, at first, decidedly unscientific, but that has proved notably successful in many difficult cases, is to give the tooth first a start upward and backward, by closing the beaks of a "cow-horn" forceps together between the second and third molars, as in the illustration.



Such a starting force should, of course, be cautiously though firmly applied. The lifting or pulling force, as in the ordinary use of extracting forceps, should be avoided. Simply to close the forceps between the second and third molars, while the former is reinforced with the pressure of the thumb, is sufficient, ordinarily, to start the third molar well from its socket, after which it can be easily taken away with any suitable forceps.

As the tapered beaks (F) of the cow-horn forceps forced between the teeth act as wedges, the force exerted may be very great, hence the necessity for caution. Injury to the second molar is the accident that would generally be most feared from this method, but a study of the relative length, size, and curvature of the roots of the teeth involved, and of the direction of the force applied, as illustrated by the cut, discovers a good margin of safety. The force applied to the third molar is upward and backward along the line C, B, nearly on the curvature (A, A) of its axis and in the direction of its least resistance. The force applied to the second molar is upward and forward, as indicated by C, D, almost across its axis, and not very far out of the line of its greatest resistance. Add to this the difference in size, length, and strength of the roots of the two teeth, and the bracing of the second molar by the teeth anterior to it, which, in case of a gap, can be made good by a mass of gutta-percha applied soft and permitted to harden, and it will be seen that there is at most very little danger of starting the wrong tooth.

There is always in extraction of teeth the possibility of injuring the bone, and there is no better way to avoid that with any method than by a constant exercise of a discriminating knowledge of the strength of the parts and of the force applied.—J. W. HOLT, D.D.S., Goldsboro', N. C.

[In the practice of the suggested method there would seem to be some risk of inadvertent fracture by reason of the powerful wedging action of the cow-horns if care were not taken to gently compress the forceps handles. If such excessive wedging action did not produce fracture, it might in some cases tend to lift from their sockets both the second and third molars. Observing due precautions, however, Dr. Holt's method utilizes the cow-horn forceps as occasional substitutes for the well-known Physick's forceps, which act on similar principles, but are not usually, as they ought to be, comprised in the extracting sets of dentists.—EDITOR DENTAL COSMOS.]

TO THE EDITOR OF THE DENTAL COSMOS:

Acknowledging many valuable hints found in the DENTAL COSMOS, I would like to contribute occasionally things which I have found of practical value. Here are four suggestions:

SECURING BITES.—Have at hand some half-inch brads, and when the wax models for an upper and lower bite are adjusted in the mouth, take a brad with the foil-pliers, hold it an instant in the lamp-flame, and place it across the two models on one side. The warm brad will melt its way into the wax, and the touch of a cold wet pledget of cotton will firmly unite the models on that side. Repeating the process on the other side and also placing a brad on the median line will so secure the bite that the models may be removed without risk of separation or displacement.

IMPRESSION-TRAY EXTENSION.—Take a strip of thin sheet lead or tin and shape it to fit the rear floor and come around on the sides of the tray, flaring backward and standing as high as desired. Drill holes through the strip and tray, and sew them together. The plaster will thus be prevented from overflow into the fauces. By simply cutting the threads the tray may be restored to its original form and be ready for another like modification to meet any peculiar case.

STANDING AT THE LEFT SIDE.—It is surprising to note the few, even among experienced operators, who stand (or sit) at the left side of the patient when scaling the teeth of that side or operating in many of the cases which can be so much better and more comfortably reached from that side.

SOAPING RUBBER-DAM.—When teeth are very close, a little soap on the rubber-dam will prevent its being torn and save so much time and annoyance that the expedient should be often mentioned for the benefit of the possibly few who do not already know it.—WILL S. PAYSON, D.D.S., Castine, Me.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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DR. J. W. WHITE, president of The S. S. White Dental Manufacturing Co., and editor of the DENTAL COSMOS, died Wednesday, May 27, 1891.

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ORIGINAL COMMUNICATIONS.

STUDIES ON THE ANATOMY AND PATHOLOGY OF THE TUSKS OF THE ELEPHANT.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

(Concluded from page 175.)

NEW FORMATIONS IN THE PULP.

By new formations (neoplasms), in the restricted sense of the term, we designate those growths whose anatomical characters differ essentially, though in varying degrees, from those of the tissue in which they are found, and which never can take on the physiological functions of the mother-tissue. They are consequently not to be confounded with simple hypertrophies or hyperplasies in which the constituents of the new growth are identical with those of the surrounding tissue.

The new formations of the soft tissue of the pulp occur, in the human subject, chiefly in connection with the molar teeth, in form of the well-known tumors variously designated as polyp, sarcoma, fibrosarcoma, etc.

These growths are naturally not found in the dry tusks of elephants, and most probably could not exist in the living tusk on account of the friction to which it is constantly subjected. Their nature is, moreover, well understood, and I pass them over with the only remark that they should not be confounded with those growths which possess all the essential histological characters of the normal pulp,—in other words, with the simple hypertrophies. True new growths (sarcomes) possess an altogether different structure: are nearly or quite wanting in nerves, have no odontoblast layer, possess exceptionally numerous and large blood-vessels, usually a radiate arrangement of the connective-tissue fibers, etc.

Some authors, and naturally those who hold that pulp-nodules are the result of a modified physiological action, may contest the propriety of calling even the hard formations of the pulp neoplasms. I think, however, that it is a mistake to attempt to make changes in the nomenclature of any formation until a certain unity of opinion regarding its nature and origin has been arrived at. It results only in a piling up of superfluous names. For a similar reason, as stated more fully below, I am not yet ready to adopt the new term *odonthel* for pulp-nodule.

The formation of the hard tooth-substance, known as secondary dentine, will likewise not receive any attention here, it being my design to confine my remarks to those formations for whose study especial advantages seem to be furnished by the tusk of the elephant,—to

PULP-NODULES,*

otherwise designated as pulp-stones, internal odontomes, dentinoids, enostoses, odontheles, denticles, etc.

While the question of the structure of the hard formations of the pulp has been pretty thoroughly investigated and in fact presents no particular difficulties, their etiology is still a subject of controversy, upon which my observations concerning the tusks of elephants may help to throw a little light, inasmuch as these, because of their large size and the great numbers of nodules found in their pulps, help to furnish a solution of certain questions whose study in the human teeth is accompanied by great difficulties.

Pulp-nodules may be classed in respect to their situation as *free*, *parietal*, and *interstitial*.

Free Pulp-Nodules.

These are found buried in the substance of the pulp without any connection whatever with the wall of the pulp-cavity, hence *free*. They are invariably found in the pulps of all tusks which exhibit any signs of pathological action, and very frequently in the pointed end of the pulps of perfectly sound and healthy tusks.

In this connection it should be remembered that the pulp of the elephant's tusk is of a conical shape, sometimes very slender and pointed, as may be seen from the accompanying drawing (Fig. 52) of the tip of the pulp of one of "Jumbo's" tusks, a photograph of which was kindly sent me by Dr. Line, of Rochester.

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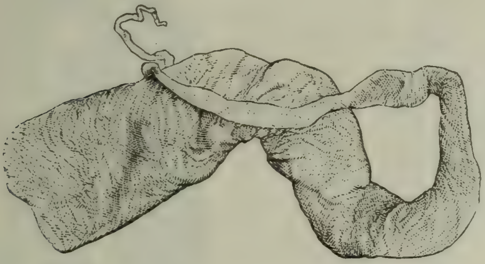
* I have retained the term pulp-nodules for want of a better one, although its inapplicability to such formations as those illustrated in Figs. 53 to 55 must be apparent to every one. The new name suggested by Iszlai at the Tenth International Medical Congress, "odonthel," from ὀδούζ, tooth, and ἧλοζ, nail, nail-head, knot, wart (hence tooth-knot, tooth-wart), I would be quite ready to accept for growths on the external surface of the tooth, or, with the prefix internal, for growths upon the wall of the pulp-chamber; the term hardly appears to me to be well suited for those hard formations which occur free in the tissue of the pulp, especially not to the comparatively giant formations in the pulp of the elephant tusk.

These nodules often occur in immense numbers, as many as three hundred having been found in the section of a tusk five inches long, taken from a point where the pulp-chamber was about one inch in diameter. In the case referred to there could be no doubt that a much larger number had already fallen out, since only remains of the pulp were still found in the pulp-chamber. From this and other observations I am convinced that the number of nodules in a single tusk may amount to many thousands. In point of size they vary from minutest specks to massive bodies as much as two inches in diameter and six inches long. I have one in my possession which has much resemblance to a large branched potato ; it is eight and three-quarters inches long, six inches in circumference at the larger end, and has a number of elliptical and spherical branches, the smallest of which is about the size of a pigeon's egg, the largest approaching a hen's egg.

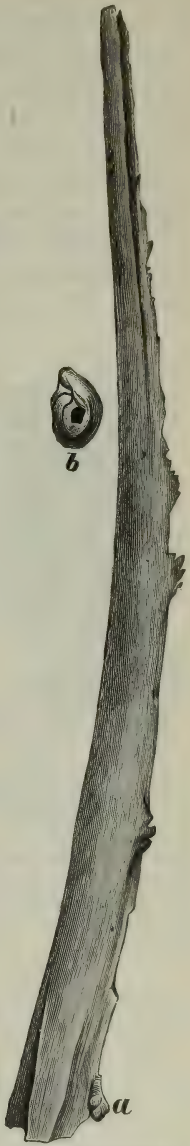
FIG. 52.



The pointed extremity of the pulp of one of "Jumbo's" tusks. (After a photograph by Dr. Line.)

In shape the nodules are spherical, cylindrical, egg-shaped, conical, acicular, or modifications of these forms. (See Figs. 53 to 56, and 64 and 65.) They are either simple or complex, the latter resulting from the growing together of simple nodules,

FIG. 53.

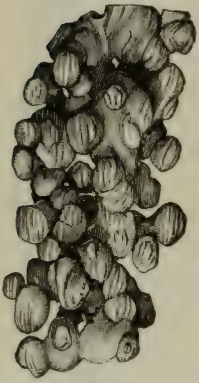


An acicular hard formation from the pulp of an elephant's tusk. At *b* a cross-section of the same (nat. size). The formation was hollow for about two-thirds of its length, as seen in *b*, and contained remains of pulp-tissue.

by which the most diversified shapes may be produced (Figs. 54 and 55).

In regard to color and texture they present marked differences, so much so that they may almost be divided into two classes: those belonging to the one being yellowish, semi-transparent, resembling a poor quality of amber; they are likewise softer, possess a lower specific gravity, and in cross-sections are completely wanting in the patterns characteristic of ivory. Those of the other class are larger, denser, and in every respect bear more resemblance to normal ivory.

FIG. 54.



A compound pulp-nodule consisting of a body and numerous pea-sized appendages. Nat. size. (This preparation was kindly lent by Professor Moebius, director of the Zoological Museum in Berlin.)

Parietal Pulp-Nodules.

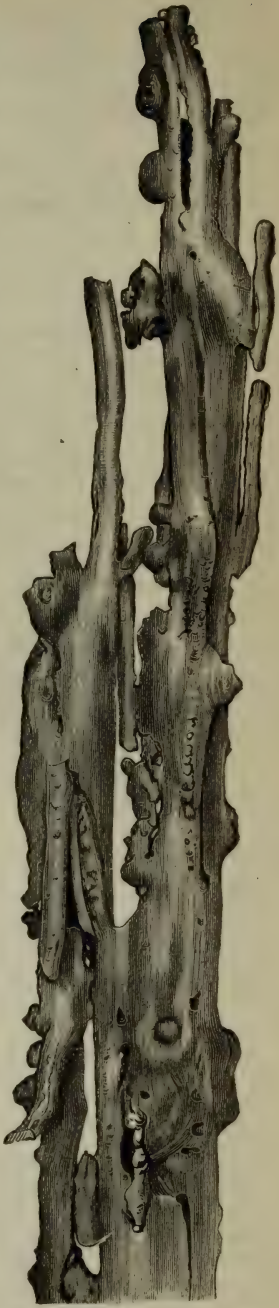
These are attached to the wall of the pulp-chamber, not, however, as we shall see farther on, growing out from it or out of it, but forming, first, free in the pulp and afterward being grown upon or over by the gradual and continual deposition of ivory over the whole of the pulp-chamber, until they finally become fixed and present to the superficial examination the appearance of having grown out from the wall of the chamber (Fig. 56).

We often find pulp-nodules half buried in the wall, and again depressions in the wall where pulp-nodules have rested without becoming attached. Nodules of this class are not very common in healthy tusks, except just at the apex of the pulp-chamber, where they may often be found projecting into it.

Interstitial Pulp-Nodules

are those which are found imbedded in the substance of the ivory (Fig. 57). Just as a

FIG. 55.

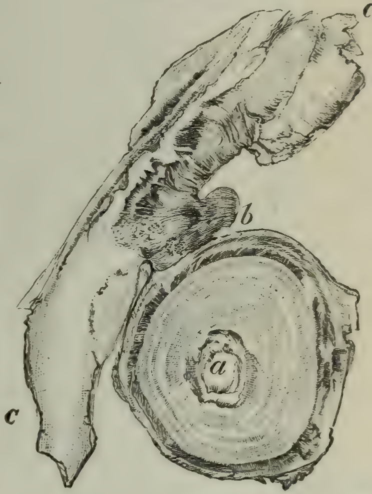


A compound hard formation of the pulp produced by the growing together of a number of simple cylindrical formations. (Nat. size.)

free pulp-nodule may become attached to the wall of the tooth, in other words may become parietal, so a parietal nodule may become interstitial, the ivory growing quite over it, in something like the way in which the wood of a tree grows over a staple driven into it, although in the former case an organic union takes place, in the latter not.

The term interstitial pulp-nodule has also been erroneously applied to another formation of an altogether different character, occasionally met with in ivory. It consists of an oval or cylindrical body of varying size, found lying loose in a cavity in the ivory, which it completely fills. It is always of very irregular microscopic structure, in parts being little more than a mass of semi-calcified pulp-tissue, and consequently very soft and chalky. Fig. 58 shows the mode of formation of these bodies ; it represents an abscess of the pulp which has been nearly filled out by a deposition of an irregular calcified conglomerate, usually designated as osteodentine. In some cases the cavity may be almost completely obliterated in this manner. On drying, this conglomerate contracts much more than the normal ivory and consequently may become separated from it either in part or totally ; in the latter case it will naturally be found lying loose in the cavity. I possess one of these bodies which is hollow and contains the remains of pulp-tissue within.

FIG. 56.

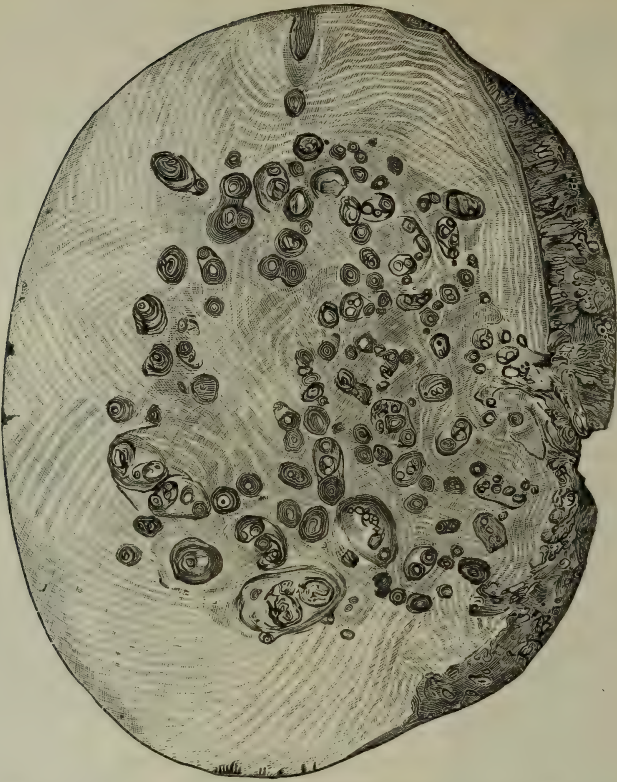


A small portion of the wall of the pulp-chamber, *c*, *c*, with a pulp-nodule becoming attached at *b*. *a*, the center, about which the nodule formed. Showing how a free nodule becomes parietal. 10 : 1.

THE HISTOLOGY OF PULP-NODULES.

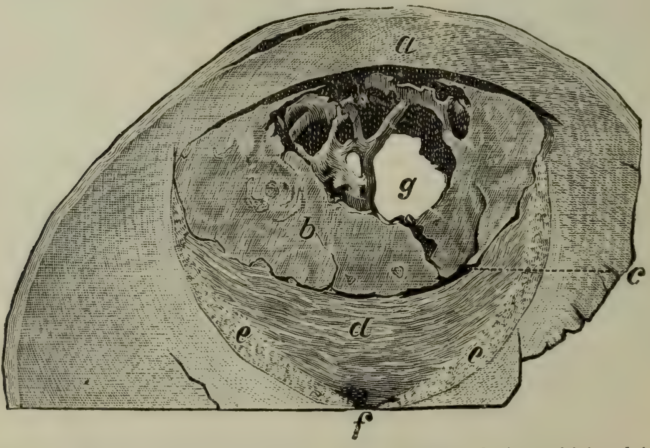
I have not much to add to what has already been written by others on the structure of pulp-nodules. They almost invariably show a distinctly lamellated structure and consist of an apparently more or less granular basis-substance, penetrated by canals bearing a close resemblance to dentinal tubules. In ground sections passing through the middle of the nodule they generally show to the naked eye a whitish opaque irregular spot at or near the center, surrounded by yellowish transparent tissue. This opaque spot (the point at which the calcification began) will be found under the microscope to contain

FIG. 57.



A cross-section of a tusk with numerous interstitial nodules. (Nat. size.) The layer of pathological ivory on the right border of the section shows that the tusk, at an early period of its formation, must have been subjected to a severe injury; the resultant irritation upon the pulp accounts for the unusual number of nodules.

FIG. 58.

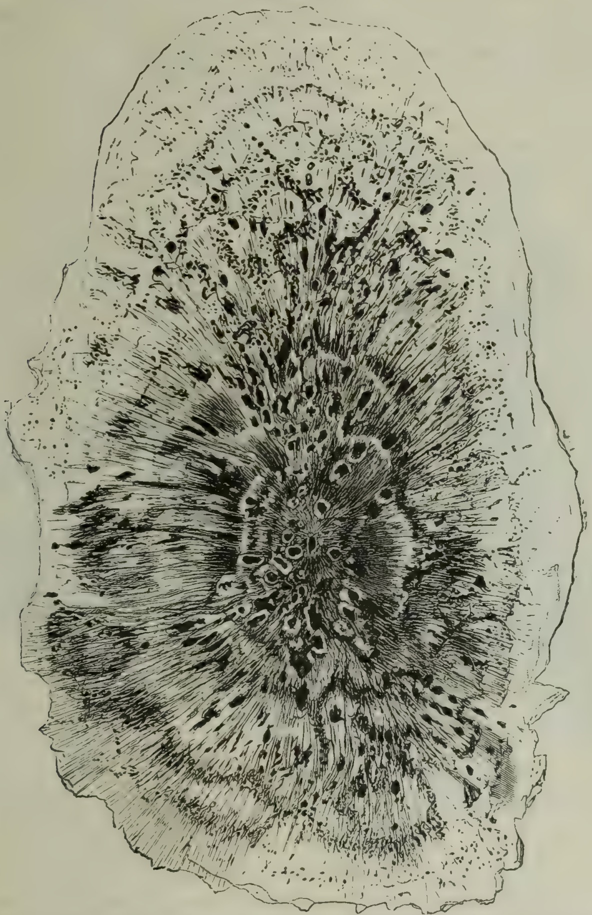


Showing the origin of bodies in ivory which may be mistaken for interstitial nodules. The abscess-cavity, which originally extended to *c*, may subsequently become almost completely filled out with a calcific mass which on drying separates from the normal ivory at the line *c*.

numerous spaces, sometimes quite shapeless, at other times very closely or indeed exactly resembling bone-lacunæ.

The tubules take their origin from these spaces or lacunæ and pass in some cases radially toward the periphery (Fig. 59). In other cases they run *parallel with the surface of the nodule*, in others they form a very intricate net-work without any definite arrangement whatever.

FIG. 59.



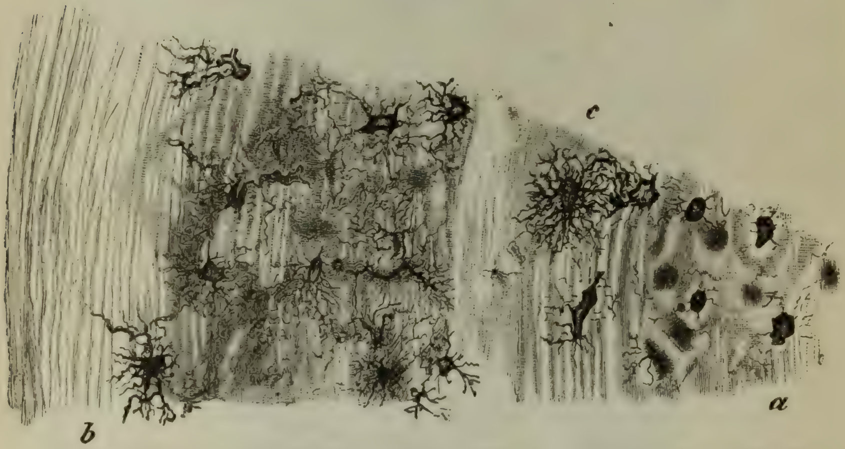
A section of a pulp-nodule showing large vascular canals around the center, also the radiating tubules, and toward the periphery irregular spaces or lacunæ. The peripheral portions of the nodule are seen to contain but few tubules, in parts none at all. 40 : 1.

Strangely enough, however, in the great majority of the smaller free nodules, they disappear before reaching the periphery, having the result that the nodules appear much more transparent toward the circumference than in the central portions. They are sometimes very scanty, at other times so numerous and regular as to produce very much the appearance of normal dentine. In fact, there is scarcely any possible conceivable disposition of the tubules with regard to number, length, and course which may not be found in examining a large number of nodules under the microscope.

Vascular canals are also frequently met with, though seldom as numerous as in the nodule represented in Fig. 59. Also bundles of imperfectly calcified fibers of connective tissue. The arrangement and number of the canals vary greatly in different parts of the same nodule.

In many nodules bone- or cement-lacunæ are present, sometimes in such numbers and regularity as to give the specimen a much greater resemblance to bone or cement than to dentine. Fig. 60, from one of the interstitial nodules shown in Fig. 57, gives a fair illustration of a case of this kind. There can be no doubt that the spaces seen in Fig. 60 are of the nature of true cement-lacunæ. The diversity in the number and distribution of the cement-lacunæ is almost as great as that in the disposition of the tubules. In some cases they are confined to the center of the nodule, in others they are distributed throughout the whole mass; the latter is particularly the case where the whole tissue of the pulp becomes involved in the process of calcification, as seen in Fig. 61, the former where the tissue is pressed aside by the growth. I have not, however, considered it necessary on this ground to make a principal distinction between these two groups of pulp-nodules.

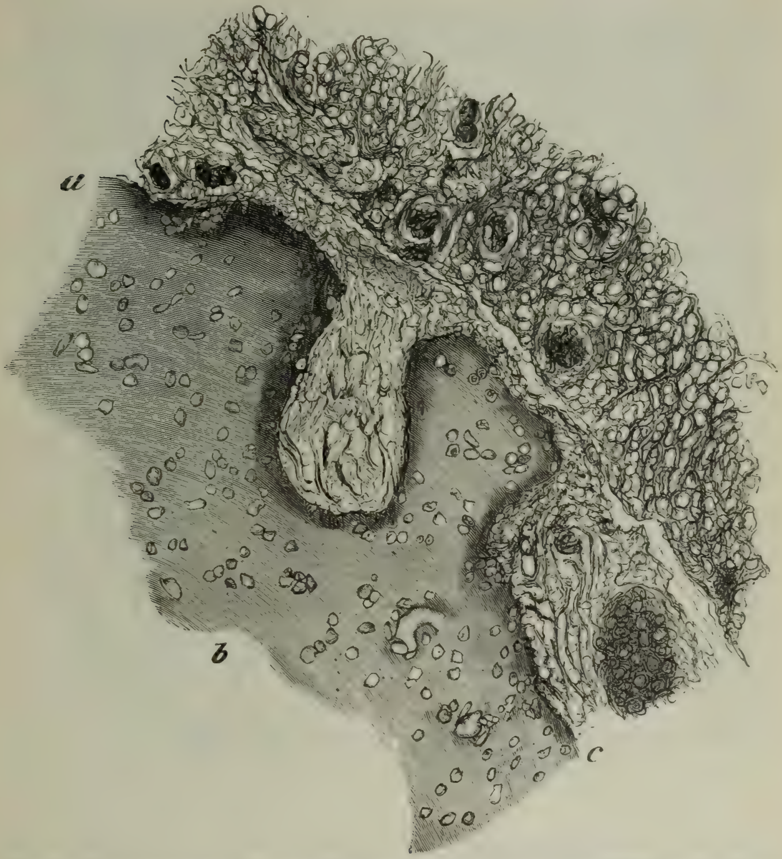
FIG. 60.



A sector from one of the interstitial nodules seen in Fig. 57. *a*, center, *b*, periphery of nodule, showing apparently perfect bone- or cement-lacunæ. 250 : 1.

Regarding the changes which take place in the pulp leading to the formation of pulp-nodules, a very fair description is given by Salter ("Dental Pathology and Surgery," New York, 1875): "The pathological changes consist in the impregnation of the various tissues of the pulp with calcareous matter, involving more and more of the structure of the pulp and its ultimate conversion, under favorable circumstances, into osteo-dentine. The whole of the tissues, cells, nuclei, connective tissue, blood-vessels, and multitudes of nerves are swallowed up and obliterated by the calcification process." Hulme (DENTAL COSMOS, 1861, p. 562) writes in the same sense: "In the formation of these nodules of ossific matter in the substance of the pulp, all the elements which enter into the formation of this organ

FIG. 61.

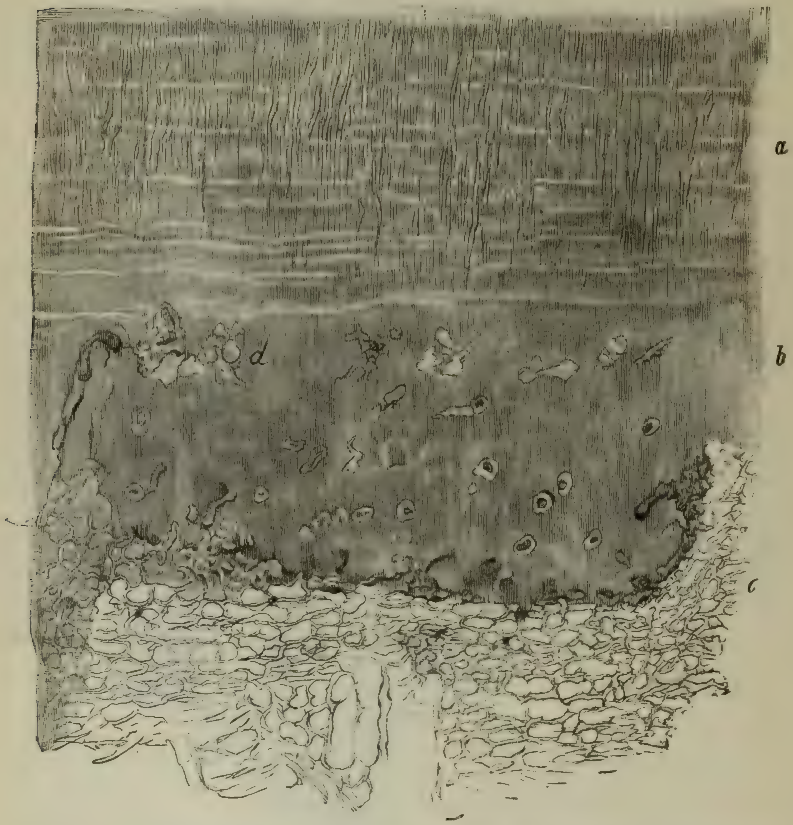


Showing the appearance of the peripheral portion of a section of a decalcified nodule (*a*, *b*, *c*), with the bordering pulp-tissue. 90 : 1. The blending of the fibers of the pulp with the basis-substance of the nodule is not brought out so clearly as it appeared in the preparation.

seem to be included (nucleated cells, connective tissue, blood-vessels, and nerves)."

The appearance usually presented by the margin of nodules in the pulp of the elephant's tusk, as seen in decalcified specimens, is represented in Fig. 61. It will be seen that there is a direct conversion of the connective tissue of the pulp into the basis-substance of the new formation. The nodule represented contained but very few appearances which could be called tubules, none at all in the part illustrated; on the other hand, a vast number of small, cement-like lacunæ, a few of which still contain traces of the nuclei of the corpuscles.

FIG. 62.



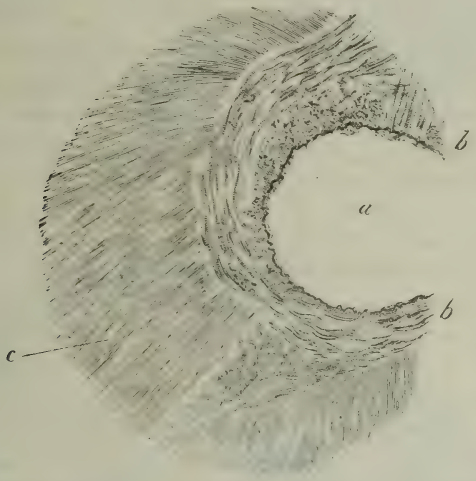
Part of a cross-section from the wall of the pulp-chamber near the point of the pulp. At *a* the ivory is still normal with exception of the fewness of the tubules; at *b* the tubules have completely disappeared and lacunæ have taken their place. *c*, remains of pulp-tissue; *d*, encapsuled uncalcified pulp-tissue. 90 : 1.

A similar formation of dentinoid or osteoid substance by direct conversion of the pulp-tissue very often, if not always, takes place where the pulp has been reduced to a very narrow body.

In Fig. 62 a case of this kind is represented. *a*, *b*, is a section of ivory taken from near the apex of the pulp ; at *a* the dentinal tubules are still present, but in much smaller numbers than in normal ivory. At *b* the tubules have completely disappeared and their place has been taken by cement-lacunæ, in most of which the nuclei of the corpuscles are clearly visible. At *d* we see remains of encapsuled pulp-tissue ; at *c* the dried pulp, the cells of which have for the most part become invisible by the long process of drying.

A similar process may be observed in the roots of human teeth, and has been referred to by Black in the "American System of Dentistry" (vol. i, p. 880), and by me in my article on "The Decomposition of the Contents of the Dentinal Tubules as a Disturbing Factor in the Treatment of Pulpless Teeth" (DENTAL COSMOS, 1890, p. 349). (See Fig. 63.)

FIG. 63.



Cross-section from the root of a human tooth, showing a process analogous to that seen in Fig. 62. About 20 : 1.

ETIOLOGY OF PULP-NODULES.

The question of the origin or mode of formation of pulp-nodules has occupied the minds of dental scientists for years, and has been the subject of much study and many communications. All the more interest attaches to the subject for the reason that a certain fundamental question is involved in its solution. Adherents of the view that a given tissue or group of cells can perform only that function for which it was specifically designated, deny that pulp can produce dentine under any circumstances except through the agency of the odontoblasts.

Busch[*] is a most strenuous advocate of this view. Reasoning from a theoretical stand-point, he maintains that the odontoblasts, and they alone, possess the capacity of forming dentine, and that the deeper layers of the pulp are absolutely wanting in this power.

The advocates of this view find it very difficult to account for the formation of free pulp-nodules. Wedl attempted to overcome the difficulty by proclaiming his well-known inversion hypothesis. He supposed that the layer of odontoblasts, through some cause or other, formed a fold which dipped or projected into the pulp pretty much as the stratum Malpighii does into the embryonal tissue of the fœtal jaw to form the enamel-organ. This fold may become detached from the membrana eboris and is then in a position to form a free pulp-nodule, or it may remain in connection with it, in which case it forms a parietal nodule which may subsequently become free by the absorption of the neck attaching it to the wall of the pulp-chamber.

This hypothesis is completely at variance with the experience of all who have made an extended study of pulp-nodules. While it is a most easy matter to find pulp-nodules (according to various estimates from ten to thirty per cent. of all pulps containing them), no one has ever yet found, among the thousands of pulps that have been microscopically examined, such an inversion of the odontoblast layer as is described by Wedl and his followers. Nor have I in the hundreds of pulp-nodules of varying sizes that I have examined ever yet met with a trace of any process allied to resorption.

Indeed, my observations have led me to regard it as very doubtful whether any growth entitled to the name of a primary parietal pulp-nodule is ever found in connection with the tusk of the elephant. In Figs. 64 and 65 I have represented two parietal nodules attached to the wall of the pulp-cavity at *a*. A very superficial examination will at once show that the center of ossification of these nodules was at about the present center of the nodules, and that they grew from this center peripherally until they came into contact with the wall of the pulp-chamber at *a*, with which they united by the calcification of the intervening tissue. We see the same process going on in Fig. 56, where a nodule is joining with the wall of the pulp-cavity at *b*. There is no possible way by which we can account for the structure of this nodule on the supposition that it grew out of the wall *c c*.

In like manner the twin nodules in Fig. 66 evidently never grew out of the surrounding tissue, but simply became enveloped in it.

A similar view was expressed by Bertin, who, in his treatise on osteology, page 242,[†] speaks of the formation of hard masses in the pulp,

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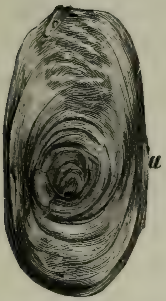
[*] *Verhandl. der Deutsch. Odontol. Gesellschaft*, Bd. I, Heft I.

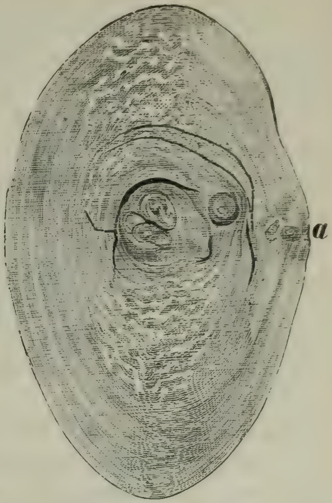
[†] See Nasmyth on the Teeth, Historical Introduction, 1839.

FIG. 64.



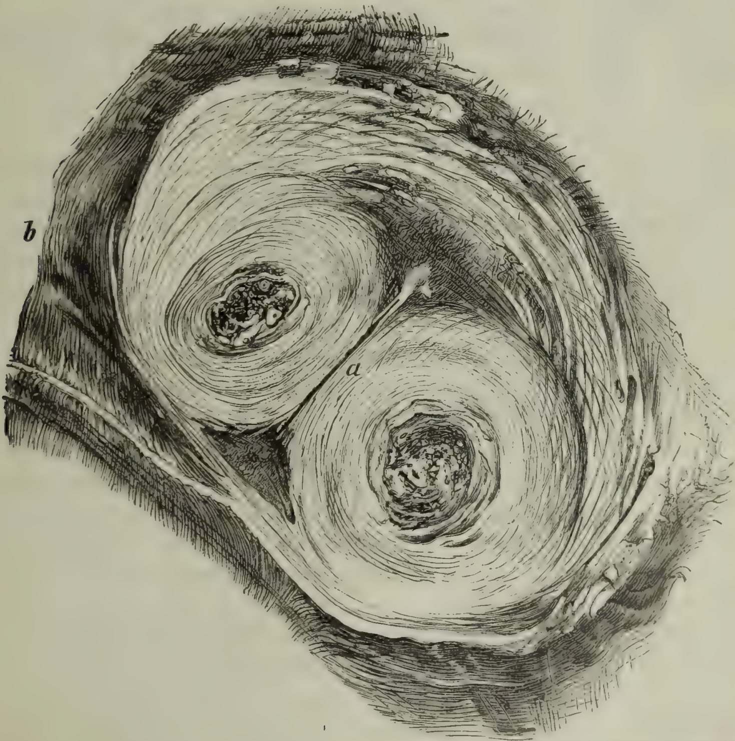
Section of an olive-shaped nodule which was attached to the wall of the pulp-chamber at *a*. The center of ossification and the spherical lamination of the nodule preclude the possibility of its having grown out of the wall at *a*. Nat. size.

FIG. 65.



Section of an egg-shaped nodule attached at *a*, and containing itself interstitial nodules. Nat. size. The same remarks apply here as in Fig. 64.

FIG. 66.



Showing that interstitial nodules do not grow out of, but become enveloped by, the ivory. The centers of formation of the two nodules, their lamination, their imperfect union at the line *a*, and the normal ivory at *b*, are plainly discernible. 25 : 1.

originally not in connection with the dentine, but *subsequently* uniting with it. Also Buckingham (DENTAL COSMOS, vol. xxi, page 457, 1879) wrote that where the pulp of a tooth became ossified it seldom or never adhered to the dentine next to which it was formed. Bödecker, too (*ibid.*, p. 337, 1882), expresses the opinion that "pulp-stones develop from medullary corpuscles, which, in consequence of a slight irritation or augmented afflux of nourishing material, arise *in the midst of the pulp.*" In other words, according to Bödecker, they develop independently of the odontoblasts.

Ullrich ("Ueber feste Neubildungen in der Zahnhöhle," *Zeitschrift der K. K. Gesellschaft der Ärzte zu Wien*, 1852, Bd. I, S. 138) likewise held the same view regarding the free formation of nodules in the pulp. He considered them as "the metamorphosis of an organizable exudation."

Arkövy ("Investigations into the Mode of Development of Odontoma Internum Librum," *Journal of the British Dental Association*, August, 1883) recognizes two modes of development of free pulp-nodules:

1. They may be developed by means of odontoblasts, though the active elements in such cases are not the outermost layers of odontoblasts, but the inner rows of cells.

2. They are also produced in the midst of the body of the pulp by simple co-operation of connective-tissue cells.

Similar views are expressed by Hohl, Bruck, Witzel, Weil, and others in the works referred to below.

Any doubt which may still have existed with regard to the formation of pulp-nodules independently of the action of odontoblasts is for me completely removed by the observations I have made on the pulps of elephants. I have seen hundreds of nodules imbedded in the pulp in all positions, some of them half an inch from the surface and having no connection whatever with the odontoblast layer.

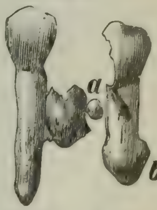
The task becomes much more difficult when we are called upon to account for the presence of dentinal tubules in the pulp-nodules, since we are accustomed to ascribe the power of forming dentinal tubules to the odontoblasts alone. Hohl ("Ueber Neubildungen der Zahnpulpe," 1868) overcomes the difficulty by assuming that new odontoblasts may be formed at any period of life and in any part of the pulp, and that the production of pulp-nodules is a physiological process modified only by the changes in the tissue of the pulp occurring in advanced age.

Witzel ("Die Behandlung der Pulpakrankheiten des Zahnes," 1879, p. 88) attributes to the spindle-cells of the pulp the power of forming tubuli. "The spindle-cells of the pulp give off fine processes, or they proliferate and form anastomoses. The basis-substance of the pulp now begins to calcify, and in the same degree as the calcification advances the spindle-cells become contracted and gradually converted into a dentinal tubule." Weil ("Die Odonthele der Zahnpulpa," *Verhandl. der Gesellschaft deutschen Naturforscher und Aerzte.*, Bremen, 1890, Sonderabdr.) believes that odontoblasts may be renewed in the pulp, and that the spindle-cells are converted into odontoblasts by the same irritation which causes the new formation ; while Bruck ("Beiträge zur Histologie und Pathologie der Zahnpulpa," 1871) goes so far as to claim that any cell of the pulp may develop dentine.

Some confusion is no doubt produced by the very indefinite conception of what a dentinal tubule is. We consequently often find elements characterized as tubules which are not at all deserving of the name. This statement is confirmed by an observation which I have recorded in Figs. 67 and 68.

On the distal surface of the root of a lower left first bicuspid extracted in the practice of Zahnarzt Dieck was found completely encased in pericementum an almost perfectly spherical nodule bearing a perfect resemblance to a pulp-nodule (Fig. 67). Ground sections of this body revealed numerous cement-lacunæ irregularly distributed throughout the preparation, being completely wanting in some parts. One of these parts is represented in Fig. 68. We see here numerous parallel wavy lines or canals which, if found in a pulp-nodule, would at once be set down as dentinal tubules, but which here we know to be nothing else than uncalcified connective-tissue fibers.

FIG. 67.



Showing, at *a*, the formation of a free nodule in the pericementum. Nat. size. (From a specimen presented by Zahnarzt Dieck.)

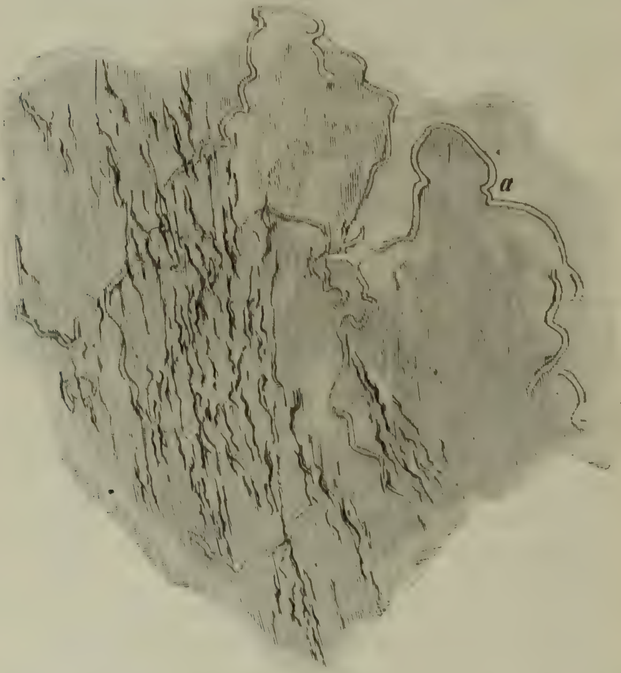
Again, in Fig. 69, from a specimen of pathological ivory, we see how spindle-shaped cells may give rise to appearances as at *a*, very much resembling dentinal tubules, but which in my opinion are not entitled to the name of such.

I am convinced that very many of the canals found in nodules from the pulp of the elephant are not at all dentinal tubules, but elements of the character of those seen in Figs. 68 and 69, uncalcified connective-tissue fibers, elongated spindle-cells, etc. We also quite often find not only single fibers, but whole bundles of them, in pulp-nodules, by which fact the view expressed is materially strengthened.

On the other hand, we undoubtedly do frequently find elements in pulp-nodules which certainly present very much the appearances of dentinal tubules. In Fig. 70 I have represented a portion of a large pulp-nodule near its center. At the center we find numerous spaces of the most varied shapes and sizes, some of which resemble bone-lacunæ, others bearing no resemblance either to lacunæ or to tubules. In connection with these irregular spaces, or apparently out of them, arise perfectly regular, parallel, wavy tubules, which we cannot well avoid classing as dentinal tubules.

A similar phenomenon may be repeatedly observed in all pathological processes in connection with the tusks of elephants. For example, in the abscess represented in Fig. 58 we have on one side of the zone *c* an exceedingly irregular conglomerate of various calcific tissues, on the other side perfectly regular dentine, while the zone itself is almost structureless. How to account for this sudden appearance of tubules is the most difficult problem connected with the study of pulp-nodules.

FIG. 68.



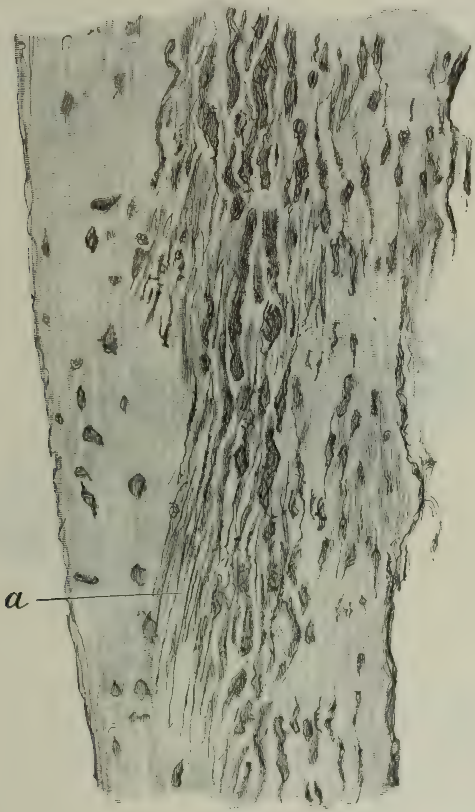
From a section of the nodule *a* (Fig. 67), showing the formation of appearances resembling dentinal tubules, by the pericementum. 70 : 1.

As already stated above, Hohl easily disposes of the question by assuming that new odontoblasts may arise in any part of the pulp; Bruck, by the assertion that true dentine may be formed by any cell of the pulp whatever; particularly the stellate cells are claimed to be often concerned in the production of nodules.

Witzel assigns to the spindle-cells the power to form tubules, and Weil transforms the spindle-cells into odontoblasts and finds, in conformity with the views of Hohl, in the formation of pulp-nodules an analogous process to the formation of normal dentine.

While assenting to the statement that any cell of the pulp may produce appearances *resembling* dentinal tubules, I must decidedly oppose the view that any cell may form *true dentine.* I also agree with Witzel that spindle-cells may form long narrow spaces in the dentine bearing a certain resemblance to tubules, as seen in Fig. 69, but that those spaces *are* tubules has not yet been proved. Of all who have attempted to account for the formation of dentinal tubules, independently of the action of the membrana eboris, it appears to me that Weil comes nearest to establishing his point, and yet the illustration which he gives, particularly Fig. 3 of his article, is not conclusive; it produces an impression rather of developing bone than of

FIG. 69.



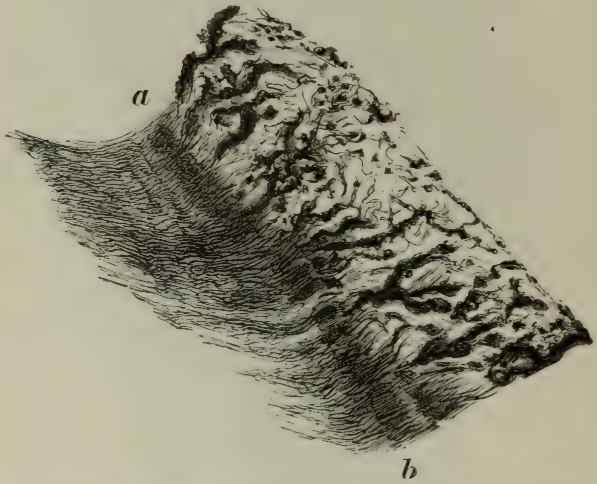
From a preparation of pathological ivory. Showing how the spindle-cells of the pulp may give rise to appearances, as at *a*, very much resembling dentinal tubules. 70 : 1.

developing dentine, although, as Weil very properly suggests in a private communication, osteoblasts and odontoblasts often present very similar appearances under the microscope.

Preparations obtained from the pulp of the elephant do not teach us much in reference to this point, because the long process of drying to which the tusks are subjected naturally very seriously affects the cellular elements of the pulp. I was, unfortunately, unable to find any nodules in the portions of "Jumbo's" pulp which Dr. Line had preserved in alcohol.

In preparations from the pulp of the human tooth I have, however, frequently met with an appearance similar to that figured by Weil: a single row of large round, oval, or pear-shaped cells, living portions of the circumference of the pulp-nodule which had no visible connection with the external layer of odontoblasts. I was not, however, able with absolute certainty to trace processes of these cells into tubules of the dentine.

Fig. 70.



Portion of a section from a large pulp-nodule. Showing at the line *a*, *b*, the sudden appearance of multitudes of apparently perfectly normal dentinal tubules. 40 : 1.

I have noticed one fact which it may be well to bear in mind in connection with this question, viz: when a free nodule comes in contact with the wall of the pulp-chamber at any point, it may soon become enveloped in a layer of comparatively regular dentine, pretty much as a musket-ball may become encapsuled and attached to the wall of the tooth. In this case apparently a layer of odontoblasts from the membrana eboris is gradually formed around the body coming in contact with it. In examining nodules from the human pulp, particularly very large or compound ones, especial care is necessary to determine whether odontoblasts from the surface of the pulp have not become implicated in the later stages of the process, a question which can only be determined by serial cuts of decalcified specimens. *A priori*, I am quite ready to accept the view that odontoblasts may be formed in the depth of the pulp independently of the membrana eboris. We know that perfect bone- or cement-corpuscles occur in secondary dentine formations and in new growths of the pulp; in other words, that osteoblasts or cementoblasts may be formed by the pulp, and the question very naturally arises, Why not odontoblasts also? I mean only to say that the evidence which has thus far been produced in support of this point does not appear to me to be sufficiently conclusive to admit of dismissing the question without further investigation in the line suggested by the communication of Weil.

The results of my observations recorded above tend toward the establishment of the following points:

1. Pulp-nodules may be formed in the pulp of the elephant's tusk under pathological conditions of any nature whatever; chiefly, however, in connection with chronic processes. They may also be formed in the contracted portion of the pulp under normal conditions.

2. They are, with exceedingly rare exceptions, and as far as my own observations go I must say always, formed free. I have never yet met with a case of a nodule growing out of the wall of the pulp-chamber, and the view that all nodules are first parietal and become free only by the resorption of the neck which attaches them to the walls of the tooth is totally at variance with the true state of the case.

3. Free nodules become fixed (parietal) when, by the growth of the nodule or by the continued process of deposition of ivory on the walls of the pulp-chamber, the nodule comes in contact with the wall and the intervening tissue becomes calcified.

4. As free nodules may become parietal, so parietal nodules may become interstitial, by the wall of ivory completely growing over or enveloping them. The nodule then of course ceases to grow.

5. Bodies which have been mistaken for interstitial nodules are occasionally found as the result of abscesses on the periphery of the pulps.

6. The connective tissue of the pulp forms the matrix or basis-substance of the nodule. Blood-vessels become in part atrophied, in part enveloped in the calcification process, and appear in the nodule as round, oval, or cylindrical spaces. Other spaces in dry nodules are the result of bundles or territories of uncalcified connective tissue, which have been torn out during the preparation.

7. The connective-tissue corpuscles, as well as the spindle-cells, may appear in the nodule in the form of more or less perfect cement-

corpuscles, or they may give rise to elongated, thread-like spaces, which some might call dentinal tubules, which I, however, would be inclined to designate as Sharpey's fibers.

It is not admissible to classify every formation which presents appearances resembling dentinal tubules as "true dentine."

8. The hypothesis that veritable dentinal tubules are formed in pulp-nodules, completely independent of the primitive odontoblasts, through the agency of newly-formed odontoblasts, while having much in its favor, requires further evidence before it can be said to be established.

THE MANAGEMENT OF ENAMEL MARGINS.

BY G. V. BLACK, M.D., D.D.S., JACKSONVILLE, ILL.

(Continued from page 358.)

THE FORM AND FINISH OF THE MARGINAL EDGE OF THE ENAMEL.

I KNOW of no writer who has used terms which clearly distinguish between the enamel margin as a line on the surface of a tooth forming the boundary of a cavity, and the edge of that margin, or the cut surface including its thickness. It will probably be better to use the term *marginal edge* of the enamel to express the latter instead of immediate enamel margin, or simply, enamel margin, as has formerly been the custom.

The marginal edge of the enamel forms an angle with the general surface of the enamel of the tooth, and it is the particular form of this angle, with its relation to the direction or position of the enamel-rods, that is important in the shaping and finishing of the marginal edge. Hence the rule: so form the marginal edge of the enamel that there shall be no short ends of enamel-rods on its outer angle, without sloping it outward so much that the margin of the filling-material will not have good edge-strength.

This is a very simple rule of practice; but to carry it out rigidly under all conditions requires an intimate knowledge of the direction of the enamel-rods upon every part of the human teeth, or a ready means of determining their direction in any locality in which operation is required. It will be remembered that the matter of cleavage of the enamel was considered under the head of "Physical Properties of the Enamel," page 9 January COSMOS, to which the reader is referred. The object of giving the marginal edge of the enamel this particular form is to prevent its becoming roughened by forcing off short ends of the enamel-rods in placing the filling-material against it, or imperfections occurring from their falling away subsequently. Anyone who has studied closely the cleavage of enamel, and has learned practically the extreme friability of the angle of a marginal edge that is sloped the wrong way, so that short ends of the rods may break away, will understand this necessity; yet in practice it is often difficult to give the angle of the marginal edge this form and at the same time not slope it outward so much that the filling-material, when placed and finished, will present so thin an edge as to be unsafe. There is the further difficulty of always being able to know satisfactorily the actual direction of the enamel-rods in particular localities. This direction is not absolutely the same upon similar parts of similar teeth. Considerable variety of direction is met with in the teeth of different persons, though there is a fairly general similarity. Therefore the direction of the enamel-rods cannot be exactly mapped out for the denture. Diagrams can only illustrate the more general course of the rods, and thus will give only a comparatively accurate guide. The microscopic study of a large number of sections of each of the different denominations of teeth will afford a familiarity with the direction of the rods upon their different parts that will be more valuable than the study of any similar number of charts. Still, the charts may be of advantage to those who may not have the opportunity of microscopic study, and seem necessary to a description of the forms which should be given to the marginal edges in various positions. In many cases the direction of the enamel-rods should be sought while opening the cavity. This is done by chipping away the overhanging portion of enamel with the chisel, as illustrated in Fig. 31, and noting carefully the direction of the cleavage.

FIG. 31.

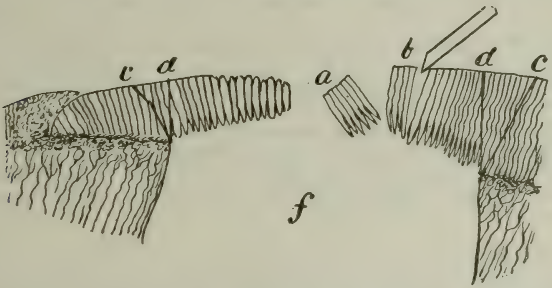


Diagram illustrating cleavage of the enamel and lines upon which the margin should be cut preparatory to filling. *a*, chip thrown off by the chisel; *b*, position of the chisel in splitting off overhanging margins; *c*, *c*, correct lines upon which to cut the margins preparatory to filling; *d*, *d*, incorrect lines for the preparation of the margins for filling; *f*. cavity in the dentine.

After becoming somewhat familiar with the direction of the rods on the different parts of the crowns of the teeth so as to apply the chisel reasonably near the right direction to give the best results, and then correcting it according to indications given by the appearance of the cleavage, the direction of the rods of any locality may be obtained with sufficient accuracy.

The illustrations herewith presented (Figs. 32, 33, 34, 35) will assist the reader in following my thought. They illustrate with reasonable accuracy the direction of the enamel-rods as shown in several sections of central incisors. The positions and directions of the sections will be readily understood from the diagrams. In each, two or more forms of cavities are illustrated by lines. I have projected the marginal ends of these lines beyond the actual margin sufficiently to show accurately the direction of the bevel which should be given to the immediate outer marginal edge. For instance, in Fig. 33, *a*, *c*, *c* shows a small cavity in the mesial surface, and the lines *c*, *c*, extending from the enamel margin, show the best direction of the outward bevel for the marginal edge in that particular locality, the enamel-rods standing as indicated by the lines illustrating the enamel. The lines *a*, *b*, *b*, in the same figure, show a more extended cavity,

FIG. 32.

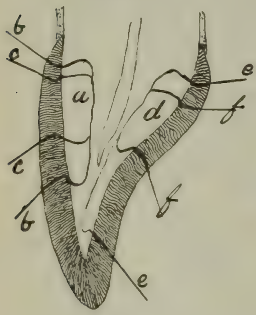


FIG. 33.

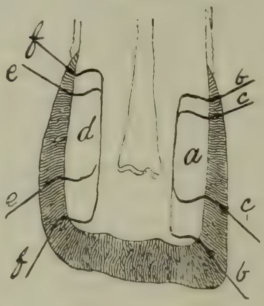


FIG. 34.

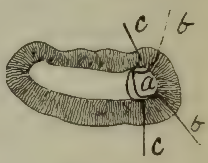


FIG. 35.

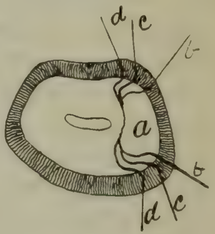


FIG. 32. Labio-lingual section of central incisor, showing the direction of the enamel-rods. *a*, *c*, *c*, lines showing form of a small cavity in labial surface; *c*, *c*, showing the best inclination of the marginal edges of the enamel; *a*, *b*, *b*, larger cavity; *b*, *b*, inclination of marginal edges of enamel; *d*, *f*, *f*, and *d*, *e*, *e*, cavities in lingual surface showing inclination of the marginal edges of enamel.

FIG. 33. Mesio-distal section of an incisor. *a*, *c*, *c*, small cavity in mesial surface; *c*, *c*, showing the inclination of the marginal edges of the enamel; *a*, *b*, *b*, larger cavity; *b*, *b*, showing the inclination of marginal edges in those positions; *d*, *e*, *e*, and *d*, *f*, *f*, cavities in its distal surface.

FIG. 34. Cross-section of central incisor near the junction of the occlusive and middle third of the length of the crown. *a*, *b*, *b*, medium cavity in mesial surface in which the lines *b*, *b*, show the best inclination of the marginal edges of the enamel when the cavity is so prepared that its marginal lines will be self-cleaning; *a*, *c*, *c*, cavity extending fully around the angle *c*, *c*, showing the best inclination of the marginal edges of the enamel.

FIG. 35. Cross-section of an incisor in the gingival third of the length of the crown, showing cavity lines with the best inclination of the marginal edges of the enamel in the several positions. Between the positions *b* and *c* would be the usual ones in which extension would be sufficient for the margins to be self-cleaning.

b, *b* illustrating the direction of the bevel of the marginal edges of the enamel. Cavities in other parts of the tooth are similarly shown by the lines and the letters. In these figures there has been no especial intention of showing the best form of the cavity in the dentine.

Whenever it is practicable, the marginal edges should first be trimmed parallel with its rods through its entire thickness, and made as smooth as possible by careful shaving or planing with a sharp, smooth-edged chisel or broad-edged excavator. These should be at hand in sufficient variety of form to enable the operator to reach and easily cut any part of the marginal edge, holding the edge of the instrument parallel with the rods, and cutting lengthwise the line of the enamel margin. It is almost impossible to make good smooth cuts of the enamel in other directions. If we attempt to cut from without inward, or from within outward, the rods will almost invariably be splintered up as in planing against the grain of a piece of wood, leaving a rough surface. When the marginal edge of the enamel has been smoothly planed in this way, the outer angle may be given a slightly stronger bevel with the smooth fine edge of a chisel to insure it against any chance of having short ends of the enamel-rods loosened in placing the filling. The outer angle of the edge should be beveled but not rounded. This distinction should always be held firmly in the mind while forming marginal edges. The angle with the outer surface of the enamel of the locality is an obtuse one in almost every instance, but should always be definite and sharp. In no case should the marginal edge of the enamel be polished with the disk, or any form of polishing powder carried by rubber, leather, or wood disks, or other semi-soft material by the dental engine or by hand. The finer polish that may be given to the marginal edge by this form of mechanical device is, no doubt, desirable if it could be safely done ; but unfortunately, by all of the plans that I have yet seen designed for this work the outer angle of the marginal edge of the enamel is rounded instead of being left sharp. In this case the marginal edge is indeed left strong and smooth, but the margin of the filling-material is given an exceedingly unfortunate form. This I have illustrated in Figs. 36 and 37.

Fig. 36 represents sections, enlarged, of fillings placed experimentally in the mesial surface of central incisors. The fillings were as nearly alike as possible, except that the first had the margins trimmed with the chisel only, the margins of which are marked *a*, *a*, while the second, marked *b*, *b*, had the margins polished with a wood point carrying pumice-stone. In Fig. 37 that marked *b*, *b*, had the margins dressed with a wood point carrying fine emery. It will be noticed that the margins marked *b*, *b*, in each case have been rounded so that the filling-material is drawn out to a thin edge (a feather edge) instead of being finished to a definite firm angle as those marked *a*, *a*. The liability of doing this with any form of polishing powders, in such positions as those in which enamel margins are placed, even by the most careful manipulation, should deter us from using this means of perfecting them, desirable as it may seem at first presentation. In margins thus polished and rounded the feathered marginal edge of the filling has not sufficient strength, and soon presents a ragged appearance. This roughness gives opportunity for lodgment and favors recurrence of caries. The marginal edges of the cavity need to have a clean, smooth cut, and definite angle, not a rounded corner. I have seen many otherwise carefully placed fillings that have been rendered imperfect by this over-working of the marginal edge. If the operator while finishing the marginal edge of the enamel keeps well in his mind the form that will be given the marginal edge of the filling, he will readily escape such results.

FIG. 36.

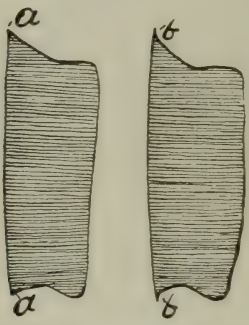


FIG. 37.

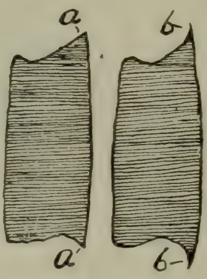


FIG. 36. Enlarged outline of filling, showing the margins as formed when the marginal edges of the enamel had been finished correctly and incorrectly. *a*, *a*, margins as formed when the marginal edge of the enamel is cut to a definite angle; *b*, *b*, margins of the filling as formed when the angles of the marginal edge of the enamel have been slightly rounded with polishing powders.

FIG. 37. *a*, *a*, Form of the angles of the filling when the marginal edge of the enamel has been correctly finished; *b*, *b*, form of the angles of the filling when the angles of the marginal edges of the enamel have been rounded by the use of emery in finishing. It will be noted that in each of these the angles *a*, *a*, are firm and definite, while the angles *b*, *b*, have thin feather edges which are unreliable.

Faults in the form of the marginal edge are liable to occur in certain positions in proximate cavities unless the operator carefully notes the direction of the enamel-rods. These positions are the lingual and labial margins in those cases in which the margins are placed upon, or somewhat around, the angle connecting the proximate with the lingual or labial surface. On the lingual angles of the incisors particularly there is much uncertainty as to the direction of the rods in the positions of the margins marked *b*, *c*, and *d*, in Fig. 34, and *b*, *c*, in Fig. 33. This uncertainty applies indeed to all parts of the marginal ridges of the incisors, in which there is great variation in the direction of the enamel-rods in different teeth ; depending largely upon the prominence of the ridges. This difficulty is quite strongly expressed also in the number of cases coming under observation in which fillings are found imperfect in this locality from the dropping out of enamel-rods within a short time after filling. Therefore the bevel of this portion of the marginal edge should be made sufficiently strong to cover the uncertainty that may exist in the case in hand, and the filling so contoured as to give it a firm angle.

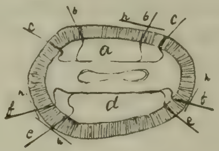
In the marginal edges marked *b*, *c*, and *d*, Fig. 35, on the labial angle there is not so much uncertainty as to the direction of the enamel-rods, yet they require that which seems a very strong outward bevel to be sufficient, so that there is a constant tendency to leave short ends of the rods at the outer angle of the marginal edge. It should always be remembered, however, that too great a bevel, and the consequent feather edge of the filling-material, is almost as dangerous to the safety of the margin as an insufficient bevel. In this respect the points marked *b* and *f*, in Fig. 33, are often especially difficult, and in practice we find a corresponding amount of failure occurring in that locality. The greater portion of this evidently occurs from insufficient bevel of the marginal edge which allows short ends of the enamel-rods to fall away, a portion from failure in the adaptation of the filling-material and a considerable number especially on mesial surfaces, from the faulty placement of the point of contact referred to on a previous page.

Bicuspids and Molars.

The form and finish of the marginal edge of the enamel in cavities in the bicuspids and molars is in every way similar to that of the incisors. In these teeth great care is to be taken in the bevel of the marginal edges when the lines of margins follow the labial or lingual angles of the teeth, or indeed any of the much curved portions of the surface of the enamel. This I have illustrated in Fig. 38, using a section of a bicuspid at about the middle of the length of the crown, and showing the direction of the enamel-rods by lines. In this I have marked the outlines of several cavities, showing the best bevel of the marginal edges of the enamel at a number of points. The cavity that would be included within the lines *d*, *e*, *e*, is such as is generally required for sufficient extension to render the lines of the enamel margins self-cleaning.

It will be noticed that upon the angles the outward bevel appears very considerable when examined with regard to its effect upon the form of the cavity, but when examined with relation to the angle with the surface of the enamel at the point of the cut edge *f*, *f*, or *c*, *c*, is no more obtuse than that formed by the cut edges *b*, *b*. That this may be more readily observed, I have drawn the lines *h*, *h*, *h*, *h*, across some of the lines of the beveled edges of the enamel and parallel with the surface of the enamel at the point of the cut. From this it is readily seen that the form or direction of the bevel of the marginal edge of the enamel is not to be considered from the stand-point of the form it gives to the cavity, but always from the stand-point of the direction of the enamel-rods. These, on the angles of the teeth, are generally very nearly perpendicular to the surface of the enamel. In this they show some variation, which may generally be found by chipping the marginal edge.

FIG. 38.



Cross-section of a bicuspid at about mid-length of the crown, with lines showing the outline of several cavities and illustrating the best bevel of the enamel by projecting lines. *a*, *b*, *b*, small cavity; *a*, *c*, *c*, larger cavity; *d*, *e*, *e*, cavity with enamel margins about in position to be self-cleaning; *d*, *f*, *f*, a more extended cavity; *h*, *h*, *h*, *h*, lines drawn across those showing the bevel of the marginal edges of the enamel and parallel with the surface of the enamel, showing that the angle formed with the surface at the point cut is about the same in the several positions.

The principles that have been illustrated apply also to the angles of the molars. Many other points upon the surfaces of the teeth might be illustrated and described, but these papers are growing beyond proper limits, and I shall be content with one other.

FIG. 39.

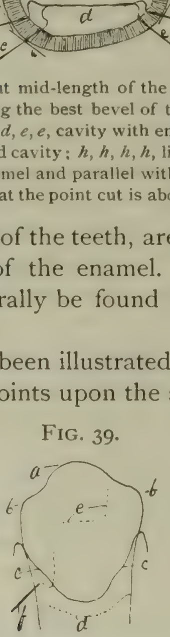
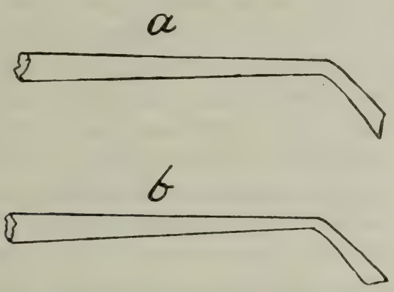


Illustration of the form of the cervical marginal edge of the enamel in proximate cavities. *a*, *b*, *b*, outline of the crown of a lower bicuspid; *c*, *c*, line of the edge of the free margin of the gum; *d*, gingival line; *e*, dotted line showing the inner line of cavity with slot cut into crown for retention; *f*, line showing the best bevel of the cervical marginal edge of the enamel.

The marginal edge of the cervical line of the enamel margin is the point of most frequent failure in manipulation on the proximate surfaces of the bicuspids and molars. This is partly from failure in finishing, but more generally from failure to obtain the best form and finish of the marginal edge. This line of marginal edge should always have a strong and definite bevel. I have illustrated this in Fig. 39.

The line *a*, *b*, *b*, shows the outline of the crown of a lower bicuspid, and *e*, the inner line of a cavity with slot cut into the grinding-surface for retention ; the line marked *f* shows the bevel of the cervical marginal edge. A bevel such as is here illustrated is necessary to prevent the danger of breaking down this margin with the heavy pressure, or mallet force, necessary at this point to make the filling-material firm enough to stand the strain of building all of the remaining portion of the filling upon it without danger of movement, and thus rendering it imperfect when finished. This bevel is best made with a long broad blade of the shape of a hatchet excavator, with the edges formed on a convenient angle. The blade for distal cavities should have the edge about parallel with the handle (Fig. 40, *b*), and that for mesial cavities should have its edge almost at right angles with the handle (Fig. 40, *a*).

FIG. 40.



Forms of instruments for trimming and beveling the cervical marginal edge of the enamel in proximate cavities in bicuspids and molars. *a*, for the mesial cavities ; *b*, for distal cavities.

These may also be made in two pairs, with the blades bent much like that of the spoon excavators in the market. Indeed, the long-bladed spoon excavators (broad ones) make good cervical margin trimmers if the edges are ground straight and of the right inclination to the handle. With these instruments the cervical marginal edge is readily trimmed to the proper form.

The form of marginal edges in grinding-surfaces is not very often at fault. Upon these surfaces the enamel-rods stand in such position that but little outward bevel is required, and the enamel is generally very strong. Still, a little outward bevel is often necessary to prevent enamel-rods from falling away from the margin, and always favors perfect packing of the filling-material against them.

(To be continued.)

MEDICAL JURISPRUDENCE.

BY N. S. DAVIS, M.D., CHICAGO, ILL.,

PROFESSOR OF THE PRINCIPLES AND PRACTICE OF MEDICINE, CHICAGO MEDICAL COLLEGE, AND EX-PRESIDENT OF THE NINTH INTERNATIONAL MEDICAL CONGRESS.

(A lecture before the Chicago Dental Club, March 23, 1891. Reported by C. STODDARD SMITH, D.D.S.)

THERE are certain principles of law applying to all skilled labor, deviating as to details only. Skilled labor requires special training on the part of the laborers to do their work. Artisans, architects, engineers, druggists, lawyers, doctors, and dentists are included in the list of skilled occupations or laborers. Individuals cannot qualify for these occupations without special training, and the law presumes that those who put their names before the public as prepared to do work in their line imply by that act a *contract*, which is held to be binding. This contract includes three things that the person assuming the trust becomes responsible for: First, that he has the necessary education and training, and that it is equal to the average education in that line in the country or State where he lives. It is not required that it shall be equal to the highest and best knowledge; the law will not hold him to that standard, but only to an *average* degree of skill and average beneficial results. Secondly, it is implied not only that he has the knowledge and education named, but that he has the necessary judgment to apply it with reasonable skill. Many persons, though educated, have not the necessary judgment and skill in application. The third item in this implied contract is that the party will exercise the necessary diligence and attention. Even highly educated and thoroughly skillful men sometimes through neglect or inattention are the cause of bad results.

This contract applies to one class of skilled labor or occupation as well as to another. Engineers, surveyors, lawyers, architects, etc., are included, and clergymen also, except that the latter have special courts to which they are held responsible. Lawyers are rarely brought up for breach of this contract, for the reason that it is difficult for clients to prove neglect or deficiency, although they are answerable for it when it occurs. Cases are on record where they have been tried and punished, but these cases are few.

Dentistry belongs to the general domain of medicine. None here will question the fact that dentistry is a department of medicine, and that the treatment of the teeth and gums comes under the same rules, without any alteration, as those applying to the domain of general medicine. The ordinary practitioner has the same advantage as the lawyer, spoken of before. If the patient fails to be cured, there is generally no deformity left; if he dies, he is buried; if he gets well, he is glad it has so resulted at last, and it is hard to locate the mistakes, if they have occurred. It is in the practice of surgery that the great preponderance of malpractice suits occurs, and occasionally in obstetrics and gynecology. In some noted medical cases, in which parties were complained of for wrong treatment, the results were more remarkable or noted than the cases themselves. The rise and progress of Thompsonianism is a remarkable history. Thompson's theory was, that heat is life, and cold is death. Vegetables grow upward, and therefore tend to life ; minerals sink into the earth, and tend to death ; the more heat, the more life ; therefore, "No. 6" (the hottest remedy) and cayenne pepper were the best medicaments. If cayenne would not do the work, then *steam* and lobelia were used. He was charged with having caused the death of several persons by lobelia and the steam-bath. When arraigned in court, it was proved that the collapse and death of one patient was caused by these applications. One of his followers administered lobelia emetics and steam-baths to a woman in the advanced stage of pregnancy, and repeated them until premature delivery and death of the woman took place ; but neither party was convicted by the courts. The public, however, convicted them so far as to stop patronizing so dangerous a system.

In medical practice, where there is no defect left, but little risk is incurred ; but in applying skill you do run this risk. You contract to possess an average knowledge possessed by others in the same calling in the place and time where you practice. This requires a knowledge of the materials you use. If the physician uses medicines, he implies that he knows their nature, action, and antidotes. In regard to materials for fillings you must know the action of the saliva upon them, and whether a particular material is capable of doing mischief in the mouth. Amalgams have been used which were very ill-adapted for that use. A dentist is required to have knowledge of materials, and their relations to other things with which they are brought in contact, so as not to do mischief to the patient. Rubber has been used so impure as to produce sore mouths ; the speaker has seen such cases, but not recently. This must apply to each and every material used. You are presumed to know the action of anesthetics, and the methods of resuscitation ; and if you are arraigned, you will appear at a disadvantage if you do not show a knowledge of all materials used.

No physician is justified in the use of secret or patent medicines. Patents, however, are open, and their composition is known. The opposition to patents is founded on the reasoning that remedies for the good of humanity are common property. Every physician has access to the accumulated knowledge of centuries, and hence he is under the strongest obligations to freely add to the common stock every item of value that he may invent or discover. If the physician using Koch's tuberculin should cause death, how would he clear himself?

Who knows what this is, how made, or how neutralized? This affords an example of how the influence of a great name in science will induce men to take hold of a remedy the nature of which is unknown to them, and administer it to large numbers of the sick. In case of death, the party, if charged with malpractice, could not justify himself before the judge or jury, on the principle that he must know the nature of the materials he uses. If he calls in experts, what do they know? Simply that Koch recommends it, but does not tell what it is or how it is made. To be obliged to make such a confession in court is humiliating to a professional man, and far from satisfactory to the court.

Questions as to skill in the choice of remedies often arise. Where there are existing evils to correct, if there are different modes used by different parties in equally good standing, it is not generally practicable to convict a party because of the use of any one treatment or the omission of some one method. If there is any injury or disease in the treatment of which all reputable practitioners use and recommend the use of the same apparatus or medicine, the individual who should neglect to use such means, if within his reach, would be justly liable for any bad results. But such a case is hard to find, as there is more than one way of treatment in almost all cases. If a poisonous dose of arsenic had been used, and the proper antidote was within reach and not applied, the party would undoubtedly suffer if prosecuted.

On the third item in the contract are founded more charges of malpractice than on both the others; that is, on want of attention, or negligence. But investigation proves that in many of these cases more blame belongs to the patient than to the surgeon. This law applies, that if the surgeon does his part, if the wound is properly dressed, and the patient alters, changes, or loosens the dressing, any such act will cut him off from damages, for he thereby assumes part of the responsibility.

Anesthetics implies a question of great importance to you. A larger proportion of deaths than there should be have occurred in the practice of dentistry. You should be able to make the proper choice of anesthetics for each case. Sometimes the length of time the anesthetic is to be continued will have an influence on the selection of the kind to be used. Always choose that which will answer the purpose with the least danger to the patient,—not that which will save the operator's time, or the patient annoyance. The forceps should be used in obstetrics only when the interests of the patient demand it, not to save time. Chloroform is pleasant to the patient, but if ten times more dangerous, the law will hardly justify its use unless there are other advantages to compensate. Choose the anesthetic that is least dangerous and most conducive to good results. It is not likely that there will ever be discovered a general anesthetic that is perfectly safe.

The basis of safety is the physiological law that they produce an effect on the periphery of the brain before they do on the base and medulla oblongata, so the mind becomes unconscious before breathing and cardiac action stop. Skill consists in carrying the influence of the anesthetic just far enough to render the mind unconscious by suspending the sensibility of the cerebral hemispheres and holding it there. Thus far your patient is safe, and you may keep him there all day ; but if its effects are allowed to extend to the respiratory and cardiac centers in the medulla oblongata and base of the brain, your patient is dead. Individual idiosyncrasies exist, of which no man can know beforehand, by which the natural order is reversed : the sensibility of the respiratory or cardiac center is suspended before the mind is obscured. There has been no excess used. These are surprising cases ; the anesthetic had hardly begun to affect the mind, when the patient was dead. This danger will always remain. Cardiac or lung disease cannot be found to exist, and a minute post-mortem will not disclose why the patient died.

An examination of the heart and lungs should always precede the use of any anesthetic. A dentist should be as thoroughly educated in all branches, from the crown of the head to the sole of the foot, as a physician, and if he would justify himself in court he is bound to examine the patient as is the surgeon or the general practitioner of medicine, or to have a competent diagnostician do it for him. If it turns out, in a fatal case, that there was fatty degeneration or pulmonary disease, he cannot be justified.

You should never administer an anesthetic alone, without a competent and reliable witness present. This applies with double force to females, for two reasons : you may need help, and the patient might die right there without witnesses ; and the other reason is that anesthetics produce impressions that last after the effect has passed off, just as some insane patients imagine that they have been abused, and lecture the public on the subject months or years afterward. It has happened that a woman just losing consciousness has experienced an erotic impression that has impelled her to kiss the operator. Married women have acknowledged that they had those feelings when in a state of anesthesia. A member of the dental profession was once convicted very unjustly, and suffered punishment. I refer to the Beale case, in Philadelphia. The patient, a young lady, took an anesthetic and had a tooth extracted ; she took it again, and had another one extracted ; recovered, and went away apparently all right, but within twenty-four hours made allegations that a rape had been committed. It was looked upon by the public as a most horrible transaction. The statements made by the woman showed that it must have been impossible. How can a person know all about what is going on, and yet not be able to resist? Was the woman a fraud? Not at all. But she was then under circumstances most favorable to occurrence of sexual impressions. She was about to be married, had just left her intended, was upon the eve of menstruation. No examination was made, yet conviction was had. In Montreal a similar case occurred: the party was arrested on a charge of rape, made on a clear and strong affidavit. The dentist was only saved by the testimony of the husband, who was present, and who stated that no such occurrence took place.

The inference from these cases is that you should always have a competent witness present when administering anesthetics. One other thing: always be prepared with the instruments and appliances which are most convenient and efficient in resuscitating patients when threatened with suspension of life from the anesthetic.

THE RESTORATION OF BROKEN INCISORS.

BY E. AMEND, D.D.S., METZ, GERMANY.

AMONG children and youths it not infrequently occurs that from falls or other accidents one or more of the incisors are broken off to a greater or less degree. In such cases the problem of effecting a suitable restoration to usefulness and sightliness is calculated to tax the resources of the most skillful dentist. The resort to gold building when but a small portion of the crown has been lost, or to complete porcelain substitution when nearly all of the crown has been broken off, are among the principal modes of practice usually adopted, and with these I have no present concern.

FIG. 1.

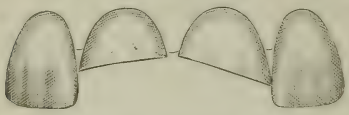


FIG. 2.

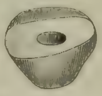
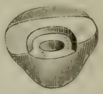


FIG. 3.



When, however, about half of a crown is absent and the pulp involved to a degree incompatible with its preservation, it has seemed to me desirable to retain the crown stump rather than to amputate it and place a porcelain crown on the root. My own method of procedure is as follows: For example, we will suppose the superior centrals to have been broken as shown in Fig. 1, and the right central selected as a model for the description, which will equally apply to the other central or to any incisor under like circumstances.

Free access to the pulp-chamber is gained by cutting an oval-shaped opening like that seen in Fig. 2. After thorough treatment and the subsequent filling of the apical part of the canal, a countersink or recess A, Fig. 3, is cut in the end of the crown, preferably with an engine pin-centered bur like Fig. 4, followed by a wheel-bur cutting also on its end to form the rearward slot of the recess. A piece of thick gold or platinum plate is drilled and cut to near the shape of B, Fig. 5, and then fitted in the recess A, Fig. 3. A suitable post, C, is then inserted through the plate, to which it is secured by wax, removed, and soldered, with the result shown in Fig. 6. The end of the post is then cut off flush with the plate, and the piece replaced on the crown as seen in Fig. 7, leaving the plate projecting from the recess as shown. A short, thin cross-pin matching-shade plate tooth like D, Fig. 8, is selected, ground to fit the smoothed natural crown end, and then backed with thin platinum, which is shaped and conformed to the lingual face of the crown. With the plate-punch and a small fissure-bur a slot, F, is cut in the extension of the backing E, Fig. 9, to allow the plate C to project through it, replaced in the crown, secured with hard wax melted over it with a hot burnisher, removed, invested (Fig. 10), and soldered so that the gold flows over the backing and its extension. The finished piece is shown in Fig. 11. This is then secured in the root and to the crown with cement, a thin film of which almost invisibly joins the porcelain tip to the crown and makes an impervious joining of the backing extension to the lingual face of the crown. The enlarged view, Fig. 12, shows in detail the relation of the several parts to each other, and Fig. 13 exhibits both centrals thus

FIG. 4.

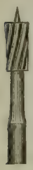


FIG. 5.

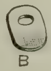


FIG. 6.

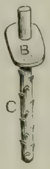


FIG. 7.

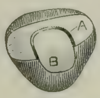


FIG. 8.

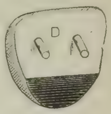


FIG. 9.

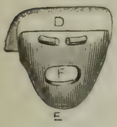


FIG. 10.

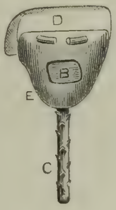


FIG. 11.

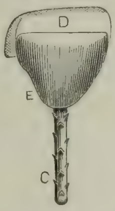


FIG. 12.

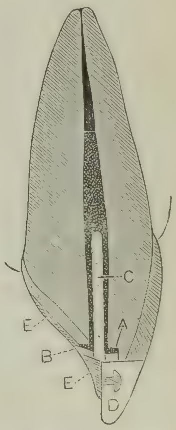
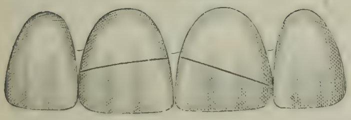


FIG. 13.



restored. The recessed plate and backing extension prevents any turning of the structure, while the post secures it against displacement under the strains of incisive use.

Much of the preliminary work may be done from an accurate impression taken after the ends of the crown have been ground smooth and true, but the fitting, assembling, and soldering of the pieces should be done while the patient is present, in order to insure the nicety of adaptation on which the permanent success of the operation will depend.

A somewhat extended and very satisfactory experience in this class of restoration affords a reasonable expectation that the method will also prove acceptable and useful to the profession.

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CORRESPONDENCE.

THE SUPREME COURT TOOTH-CROWN DECISION.

2231 PRAIRIE AVENUE, CHICAGO, May 10, 1891.

EDITOR OF THE DENTAL COSMOS:

Dear Sir,—It may be assumed that a brief summary of the results of the recent litigation of the International Tooth Crown Company *vs.* Edward S. Gaylord *et al* before the U. S. Supreme Court will be of interest to all dentists. The case alluded to was on appeal from the Circuit Court for the District of Connecticut by the Tooth Crown Company, and has now been finally settled by a unanimous decision of all the judges of the Supreme Court of the United States. The Dental Protective Association defended in the Supreme Court, at the request of and in association with the committee known as Dr. Northrop's committee, which had been created before the organization of that association.

As the result of this decision, all the forms of the Richmond crowns which were in litigation are now open to the dental profession for manufacture and free use, as well as the Richmond method or process of preparing roots for his crowns, which was a patent for cutting off the tooth, driving the pulp out, and filling the end of the root at one operation.

The decision of the court is in substance as follows:

That what Richmond had done before the taking out of his crown patents disclosed substantially whatever invention there was in his crown or process of making; and this invention having been in use over two years before being patented, was open to the public. To overcome this, some change in methods of construction was made before the patent was applied for, and this was made the claim for sustaining the patent, on the ground that only after this change was the invention a success. To this the court replied that whatever change was made as appearing in this patent from what existed before and was known to modern dentists, was not invention within the meaning of the law, but was such a procedure as would occur to an ordinarily skillful dentist. The patent on preparation of roots for crowns was also dismissed on ground of prior use, and absence of patentable novelty.

It must not be forgotten that while this decision is of great value to the dental profession, it does not by any means end the litigation with the International Tooth Crown Company. That company owns some twenty-five or thirty other patents relating to dentistry, some of them being in suit. One of these patents, known to the profession as the Low bridge, was sustained in the United States Court of the Southern District of New York in 1887, which was before the organization of the Dental Protective Association.

J. N. CROUSE,
Chairman Dental Protective Association of the United States.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

THE forty-second annual meeting of the American Medical Association was held at Washington, D. C., commencing Tuesday, May 5, and continuing four days. The next meeting will be at Detroit, Mich., beginning the first Tuesday in June, 1892.

The Section on Oral and Dental Surgery met in the lecture-room of the Medical Department of the Columbian University.

FIRST DAY.

The section was called to order at 3 P.M. by Dr. E. S. Talbot, chairman. The secretary, Dr. H. W. Morgan, being absent, Dr. L. E. Custer, of Dayton, Ohio, was elected secretary *pro tem.* The chairman then read his annual address, of which the following is an abstract :

He said dentistry from the earliest period up to the present time has been practiced by medically educated men.

Hippocrates, 460 B.C., speaks of dentifrices and the fixing of the teeth. Celsus at the end of the first century, Aetius in the sixth, Egenolff and Ambrose Paré in the fourteenth, all mention certain forms of treatment of the teeth. John Hunter, 1728, spent much of his time in the study and treatment of the teeth, as well as in the study of general anatomy. Fouchard, 1747, and Bourdet, 1786, practiced dentistry, and also wrote extensively on dental subjects.

The instruments for dental as well as surgical purposes, which are to be seen in the museums of Europe, together with the beautiful specimens of Etruscan and Phœnician dentistry now in the possession of Drs. Van Marter, of Rome, Barrett, of Buffalo, and Taft, of Cincinnati, are striking illustrations of the superior ability which men of early times acquired.

About 1826–1830, the practice of dentistry was not wholly in the hands of a reputable class of individuals. Watchmakers, barbers, and others who were only rude mechanics had taken up the practice for the money that was in it, and were extracting teeth and inserting artificial ones as best they could. There were, however, a few medical men practicing dentistry who had obtained a high standing, and were anxious to hold their special calling upon an equal footing with other branches of the healing art. Among those whose names stand out conspicuously in the history of this country are Parmly, Brown, Hayden, Tucker, Hudson, Greenwood, Maynard, Harwood, Harris, and Keep.

It was not until 1839 that any movement in the way of organization was made on the part of these men to elevate their specialty into recognition as a branch of medicine. At this period the *American Journal of Dental Science* made its first appearance, with Dr. Chapin A. Harris and Eleazer Parmly as its editors. The American Society of Dental Surgery was organized in 1840. In connection with these movements it was the ambition of Dr. Harris to organize a dental school in connection with the medical department of the University of Maryland. The practice of dentistry at this time being, with few exceptions, at a very low ebb, the faculty of the university did not deem it of sufficient importance to justify such action. The suggestion of Dr. Harris was therefore rejected. This gave him new energy, and as a result the Baltimore College of Dental Surgery was established, but the school of medicine and the school of dentistry ignored each other for a time.

Whether the establishment of a strictly dental school, together with the conferring of a separate degree from that of the medical school, has benefited dentistry, it is difficult to say.

The original idea of Dr. Harris, if it could have been successfully carried out, would no doubt have placed dentistry as a calling upon a higher plane than it occupies at the present time, but, forced upon its career with a new degree, with very little aid from the medical profession, it had to work its own way as best it could. The Baltimore college, owing to the talent of unexceptionably able men, flourished, and men of ability were graduated, who practiced dentistry in different parts of the country, with the new degree of "Doctor of Dental Surgery." So successful was this college that other schools of dentistry were organized shortly afterward, and these in their turn became as successful as the mother school.

From the first, graduates of dentistry who were ambitious to excel have never been satisfied with a dental degree only, and many men, anxious to acquire higher attainments, have taken the medical degree also. Many of the dental faculties have in many instances made such arrangements with medical colleges that by taking one additional course their students could receive both degrees.

The first dental college to unite with a medical college was the St. Louis, which was founded in September, 1866. Its first announcement stated that its students would have the benefit of the lectures in anatomy, chemistry, physiology, and materia medica that would be given to the matriculants of the St. Louis Medical College. Following this, in 1867, the Harvard Dental School was organized in connection with Harvard University. Since that date most of the universities in this country have established dental departments. The older dental colleges are uniting themselves as rapidly as possible to universities, so that at the present time nearly one-half of the dental colleges are departments in the different universities. Ever since the formation of the Massachusetts Medical Society, in 1781, it has had members practicing dentistry; and the Suffolk District Medical Society, which is a part of the Massachusetts State Medical Society, created a section in 1866, called No. 5, for "Surgery and Dentistry"; this is now a quarter of a century old. In Massachusetts forty or fifty years ago no reputable dentist would take a pupil unless he would engage to take a full medical course, or had already graduated in medicine. Scarcely a dentist who has been in practice for twenty-five years but who is anxious to have his sons take a full course in medicine before taking up dentistry.

This brief history has been given to show that our best educated early practitioners in dental surgery have always regarded it as a specialty in medicine rather than as an independent profession. Dr. Harris, in his inaugural address at the opening of the Baltimore College of Dental Surgery, said, "Allow me to observe, however much interest or curiosity the establishment of this institution may have awakened, it constitutes an era in the history of a most useful and valuable department of medicine." In speaking of the empiricism that had up to that time existed in the practice of dentistry, he said, "I feel bound to the public and to my own reputation to denounce the empiricisms that have existed and do still exist in this department of medicine;" and added, "It is to be hoped that the day is not far remote when it will be required of those to whom this department of surgery is intrusted, that they shall be educated men."

With the convening of this meeting, the Section of Dental and Oral Surgery in the American Medical Association enters upon the tenth year of its existence. At the session of the association held in Richmond, Va., in 1881, Drs. W. W. Allport, T. W. Brophy, E. S. Talbot, Chicago; Dr. J. L. Williams, Boston; Dr. D. H. Goodwillie, New York; Dr. D. C. Hawxhurst, Grand Rapids, Mich., and Dr. G. L. Parmele, Hartford, Conn., practitioners of dentistry holding medical degrees, presented themselves as delegates from local medical societies for the purpose of organizing a section on dental and oral surgery. The oldest members, and especially the ex-presidents of the association, were heartily in sympathy with the movement, and were anxious to assist in bringing it about. At the morning session, Thursday, May 5, Dr. Samuel D. Gross, of Philadelphia, asked for a suspension of the regular order of business, which motion was granted. He then moved that the by-laws of the association be so amended as to create another section, to be known as No. 7, entitled Dentistry. The motion was favored by Dr. Sayre, of New York, and Dr. N. S. Davis, of Chicago, and was adopted. The object of suspending the rules at this time was for the purpose of creating the section, so that we might organize and commence work at that session, the members who were to constitute the section being prepared with papers for that purpose. Dr. Toner, of Washington, objected, saying that he was not opposed to the section organizing and commencing work this year, but he did not wish to make a precedent for future sections. It was therefore decided that it could not go into operation until the next year, when, according to the constitution and by-laws of the association, dentistry was officially recognized by the American Medical Association. Since then the Section of Dental and Oral Surgery has been recognized, like other sections, as a part of the whole, and the members of the association are in full accord with the dental specialty as a part of the general body.

Since the organization of the section, editors of medical journals have become more liberal as well as more intelligent in their discussions of dental subjects; physicians have accepted invitations to read papers before local dental societies, and dentists have read papers before medical societies. This shows the interest which an interchange of thought is developing by the union of the different branches of the healing art. Since the formation of this section, through the efforts of Dr. W. W. Allport, the necessity of teaching in regard to dental diseases has been recognized in six of the medical colleges of Chicago, and the example has been followed in other colleges. To-day the chair of Dental and Oral Surgery exists in many of the medical colleges of the country, and the students are taught dental anatomy, physiology, and pathology. This is as it should be. No medical student should be allowed to graduate without an appreciation of the relation between the diseases of the mouth and systemic derangements, as well as the effect upon the mouth of constitutional diseases, and no medical college to-day can be considered complete which ignores such teaching.

In view of the fact that able practitioners of dentistry were debarred from becoming members of the American Medical Association on the ground that they did not belong to a local medical society, Dr. Allport, with the assistance of Dr. N. S. Davis, procured the unanimous adoption of the following resolution in 1887 :

> *Resolved*, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education, and a term of professional study equal to the best class of the medical colleges of this country, and embrace in their curriculum all the fundamental branches of medicine, differing by substituting practical and clinical instruction in dental and oral medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in this association on the same conditions and subject to the same regulations as other members.

In the following year, 1888, the Chicago Dental Club having adopted the code of ethics of the American Medical Association, sent the following delegates as qualified under the resolution : W. W. Allport, A. E. Baldwin, John Marshall, and E. S. Talbot, and since that year the Dental Club has continued to send members to the association.

The adoption of the above resolution by the representative medical society of the country would seem to show that the medical profession has done its full part to recognize properly educated dentists as legitimate specialists in the practice of medicine. The question of relationship being thus definitely settled, the only question remaining is, What proportion of dentists will so qualify themselves to practice dental and oral surgery that they will have the right to be classed as medical specialists, the same as surgeons and ophthalmologists, and entitled to recognition in the association, in accordance with the letter and spirit of the resolution quoted?

After the reading of the address by the chairman, a paper by Dr. Alton H. Thompson, of Topeka, Kansas, on

THE TEETH OF INVERTEBRATE ANIMALS,

was read by Dr. J. S. Marshall. An abstract of this paper is herewith given.

The paper called attention to the infinite resources of nature ; to the expedients to which she resorts as marvelous and endless in their variety; to the fact that when new conditions are to be met her invention is never at a loss, and her capacity for change is boundless; that environments change and corresponding alterations in organs arise to meet the new conditions presented; that the life of a species depends upon this power to change, to conform to new environments—the law demanding adaptation or extinction.

In no set of organs—in animal life at least—is this infinite variety of resources, or the capacity for change, or the power of invention, so fully illustrated as in the teeth. Food selection has created a wonderful variety of forms of teeth which have arisen in response to changes in the food environment. Those species which could conform to gradual change survived and transmitted the acquired modifications in the dental apparatus. Those which could not change perished, or escaped to a more favorable food environment. From such causes many variations in the teeth of animals arose in the course of the geological ages, and, taking the living and the extinct species all together, the number and extent of these variations is beyond estimation. The variety presented in the different forms of teeth and masticating apparatus throughout the animal kingdom illustrates and exemplifies the fact that these organs are susceptible of great variation, and that the possibilities of change and the invention of nature are especially marked in them.

If vertebrated animals present great variations, and many extraordinary forms and interesting extremes in the structure of the dental armature, so also do the invertebrate animals, although these are not so well known. To the naturalist and the philosopher the latter are equally interesting, however, and serve to enlarge his views of the wonders and beauties of nature. To the dental student the teeth of invertebrates are interesting from the comparative stand-point, and serve to illustrate the remarkable possibilities of dental variation, and help to a better understanding of the principles of the mechanical evolution of the teeth of animals. In such studies any knowledge is valuable which may contribute, even remotely, to a better understanding of the important organs which he is called upon to preserve, and thus better prepare him for his chosen work. The study of comparative anatomy is of great value for the side-lights it throws upon the teeth of man,—their origin, evolution, mechanical design, etc., and therefore he claimed that the study of a branch, even as far removed from man as the invertebrates, is of sufficient value to warrant the presentation of a brief epitome of knowledge of this branch, by way of stirring up an interest in it as an incentive to further study and investigation.

Professor Huxley says ("Anatomy of Vertebrates"), "When invertebrated animals are provided with teeth or masticating organs, the latter are either hard productions of the alimentary mucous membrane, or are modified limbs,'' as opposed to vertebrated animals, which also ''usually possess hard productions of the alimentary mucous membrane in the form of teeth ; but their jaws are ordinarily parts of the walls of the parietes of the head, and have nothing to do with the limbs.'' The vertebrate jaw is part of the endo-skeleton; the invertebrate jaw belongs to the exo-skeleton, as do the teeth of all classes of animals, as illustrated by their embryology.

Mr. W. H. Dall says (''American System of Dentistry''), ''Almost every large group of organisms below the vertebrates, until we reach the molluscoida and lower radiated animals, exhibits in some of its members one form or another of prehensile or masticatory apparatus connected with the alimentary canal. None of these exhibit true homologies with vertebrate teeth, though some of them present remarkable similarity to the latter in external relation. They are divided into mandibular and dental appendages in the sense in which the latter may be said to exist in the invertebrates.

''Throughout the invertebrates the teeth are dermal structures, however much modified, and may consist of calcified connective tissue, of horny matter, or of chitine or an allied substance. The teeth and jaws of mollusks, the nippers, mandibles and setæ of worms, are composed to a greater or less extent of chitinoid material.''

Professor A. S. Packard says (''Standard Natural History''), ''Hard bodies serving as teeth occur for the first time in the animal series, in the sea-urchins, where a definite series of calcareous dental processes or teeth, with solid supports and a complicated muscular apparatus, serves for the comminution of food. Among the worms the organs of mastication for the first time appear in the Rotatoria, where the food, such as infusoria, etc., is crushed and is partly comminuted by the well-marked horny and chitinous pieces attached to the mastax. In most other low worms the mouth is unarmed. In the leech there are three, usually in the annelids two, denticulated, serrate, chitinous flattened bodies situated in the extensible pharynx of these worms, and suited for seizing and cutting or crushing their prey.

''In the higher mollusks, such as the snails and others, besides one or more broad pharyngeal jaws, comparable with those in the worms, is the lingual ribbon, admirably adapted for sawing or slicing seaweeds or cutting or boring into hard shells, acting somewhat like a lapidary's wheel ; this organ, however, is limited in its action, and in the cuttles, the jaws, which are like a parrot's beak, do the work of tearing and biting the animals serving for food.

''In the Crustaceans and insects we have an approach to true jaws, but here they work laterally, not vertically, as in the Vertebrates ; the mandibles of the Articulates are modified feet, and the teeth on their edges are simply irregularities or sharp processes, adapting the mandibles for tearing and comminuting food. The numerous teeth lining the crop of Crustaceans and insects serve to further comminute the food, keeping the larger particles back till finely crushed.''

Professor Bradley says (''Manual of Comparative Anatomy''), ''The lowest forms possess no teeth, except some ciliate infusoria, which have an internal cylinder of parallel rods for the mastication of food. In the Rotifera, the denticles are in the shape of denticulated plates. The Echinodermata have five large teeth placed in the formidable apparatus called 'Aristotle's Lantern.' In the Annulosa, the leech is the only member that possesses teeth, the semi-lunar plates imbedded in the muscular walls of the mouth ; but the remaining classes have only mandibles and maxillæ, which are very hard and chitinous. Among the Mollusca, the Gasteropods possess a strap-like organ, the odontophore, which is studded with teeth. Cephalopods possess horny jaws which move vertically. Some other classes have denticles besides.

''In the Annelids (Dall, op. cit.), so-called teeth occur in many groups, but partake rather of the nature of jaws than teeth. This group comprises most of the worms, as well as the leeches. Their bodies are divided into more or less well-defined regular segments, and in general the jaws are on the second or buccal segment, or on a proboscis which is itself on the outer edge of this segment, and may be protruded from the mouth to a considerable distance. They are chitinous, most commonly paired, lateral and opposite, of almost infinite variety of form, resembling in a general way the maxillæ of insects, and mimicking in miniature hooks, combs, saws, rasps, claws, etc.

''In the leeches, the mouth is provided with three lenticular jaws, with the projecting edges finely serrated, having a partly rotary motion about a point central to the three. The medicinal leech has two rows of serrations on each jaw.

''Among the Crustaceans, lobsters, shrimps, crabs, etc., the maxillary organs are but modifications of entire limbs translated from the locomotive series and set apart as special mouth organs. In the higher Crustaceans, the interior part of the stomach is provided with certain masticatory appendages or stomacholiths, often termed teeth, though more analogous to a sort of a calcareous gizzard. These consist of several calcareous pieces, moved by appropriate muscles, inserted in the membranous wall of the stomach, armed with a smooth median plate and lateral molar-like organs, whose mimetic resemblance to the molar teeth of mammalia affords a beautiful illustration of the way, through the selective influence of similar functions, analogous structures may be built up in organs which have no homology whatever. Two smaller points—bicuspid in the lobster, tricuspid in the crab—complete the calcareous apparatus.

"Among the Echinoderms, the sea-urchin has a remarkable apparatus called 'Aristotle's Lantern,' which contains what may be fairly regarded as true teeth. It is very complicated in its arrangement, but in essentials consists of five hard, calcareous, wedge-shaped sockets or alveoli, each containing one porcelainous chisel-shaped tooth. The teeth are, like those of rodents, usually worn more on the inner than on the outer side, and therefore in wearing always preserve a sharp edge. The combination of the teeth and alveoli produces a pentagonal cone, the apex being formed by the coming together of the points of the teeth. In life this cone is concealed within the tissues, only the points of the teeth projecting."

Not many of the Mollusca are provided with teeth ; the entire group of Acephala (the headless mollusks such as clams, oysters, mussels, etc.) are entirely without head or dental apparatus, and not every one of the Cephalopoda (whelks, snails, periwinkles, etc.) are provided with teeth, but most of them have such organs. When they are found, they are arranged on the "odontophore, a chitinous band upon which the teeth are set, pointing upward and backward like the papillæ on a cat's tongue, and it grows out of the radular sac in the floor of the gullet. The floor of the sac is carried forward, with the radula upon it, over an arched, cartilaginous mass called the buccal cartilage and down to the front edge, immediately behind the mouth. This serves as an elastic pad which may press the denticulated surface of the radula against any object to be torn or cut. This is controlled by muscles which draw it backward and forward, or even protrude it, as can be seen in the common wood-snail," in which the buccal mass is pushed forward to seize and cut food. In the snail the number of these teeth is remarkable. Twelve thousand to forty thousand have been counted on the saw-like lingual ribbon. It can cut grass or leaves sharply off. As the teeth are worn off the ribbon, it is uncoiled and new teeth are thus brought into use. The upper part of the mouth is lined with a horny substance, against which the sharp-toothed tongue works with a rasp-like motion. The tough leaves of the lily may often be found cut by the snail's lingual ribbon.

"The teeth on the strap-like odontophore are varied and remarkable in shape and size, and are difficult to examine, as some of them are very minute and hard to dissect out and study. They are usually composed of a base, a shank or stem, and a cutting-edge, the latter simple or variously denticulated. The form of the cutting-edge is varied, the carnivorous forms usually having simpler and more clawshaped teeth. When arranged in rows, as they are in many forms, the middle row is called the median or rachidian teeth, and the lateral rows, the lateral or pleural teeth. The latter are usually right and left. Sometimes there are teeth outside of the lateral rows, which are called the uncini, and are flat, plate-like, or slender, spiny teeth. They may be very numerous, as in the vegetable-feeding snails, or wholly absent in other forms."

There is much to be observed about the teeth of the snails and their allies, and the field offers a profitable opening for investigation. They are already divided into classes by an elaborate system of arrangement, but much remains to be done in describing varieties.

"The adult perfect teeth vary from nearly transparent to an amber-yellow or reddish brown, and sometimes the cutting-points are black. In any large whelk they are easily seen, and in a large cuttle-fish the radula may be an inch wide. On the other hand, in some small land-snails, where the whole shell is not larger than a pin-head, high powers are necessary to observe them. The highest type in the system of classification is called the Toxoglossate, or arrow-toothed, from their narrow, round form, often barbed, and sometimes hollow to inject poison, as in Bela or Conus.

"Next comes Rachiglossa, having only rachidian teeth, as in the common whelk. The teeth are usually slight and varied, and prettily denticulated on the cutting-edge. The next is the Tœnioglossa, bent-toothed, including the greater part of the fresh-water snails. The Ptenoglossa, feather-toothed, are a small group, of which the sealaria is a member. The Rhiphidoglossa, needle-toothed, comprise a large number of sea-snails, and a few operculated land-snails. The last is Docoglossa, chevron-toothed, and includes the limpets."

Some snails present a pavement-like form and arrangement of teeth, which are often of a very pretty pattern, or again a mere hardened mass.

The object of the paper was to give briefly the outlines of a study of the teeth of invertebrates, merely to indicate the extent of the subject, and to suggest the interest and attractiveness there is in its pursuit to the naturalist; and in addition that the study of invertebrate odontology has a positive value to the comparative dental anatomist, from a philosophical stand-point. As a leaf from the great book of nature, it unfolds many of her beauties and wonders. The subject is also pregnant with suggestions to the dental student who follows it out into all its branches. So in this branch there are varieties of form and adaptation to purposes which are not paralleled in the vertebrates. The study of their forms and fitness to perform particular duties is full of interest and surprises, in the fertility of design which nature exhibits. Then the analogies presented are very interesting, as in the case of the cuspidate teeth of the stomacholiths of the Crustacea, which resemble vertebrate grinding-teeth, and show that similarity of function often develops similarity of form, even in dissimilar parts.

Of homologies with vertebrate teeth, there are few, as the jaws of the articulates work horizontally and those of vertebrates vertically. In the few instances of invertebrates which have vertical jaws, those parts are armed with beaks and the teeth are situated farther back on the odontophore. The teeth of the sea-urchin have true sockets and alveoli, but their arrangement, support, and motion are very different from those of the vertebrates: so that taken altogether the class presents few homologies with vertebrates, or even resemblances to them, and thus affords a variety of illustration that the latter does not supply.

On motion, a committee was appointed to draft resolutions on the death of Dr. W. H. Atkinson, of New York, and Dr. E. Maynard, of Washington, D. C.

The committee subsequently reported resolutions which were unanimously adopted, paying high tribute to the character and services of the gentlemen named.

Second Day.

The section was called to order at 3 P.M.; Dr. E. S. Talbot in the chair.

Dr. George S. Allan, of New York, read a paper, of which the following is an abstract, on

The Genesis of Contour Fillings.

He claimed that it was generally accepted by the dental profession that the contour filling represents the highest development of the art of conservative dentistry. He thought it a healthy sign of growth that the highest ideal is thus kept well in the foreground. He proposed to confine his remarks entirely within the lines marked out by the title of his paper,—the genesis of the contour filling, or how it is made. So far as he knew, the cardinal rules to be kept in mind in this kind of work have never been presented to the profession in compact form.

He referred to a private letter from an acknowledged authority on the subject, as follows:

"To understand me more completely I would state that I have not for a considerable time been in favor of inserting very large gold fillings in this manner, and for the reasons you have given in your paper, that the structure and elements of the tooth are not such as to promise a durable retention of the mass of gold by the weakened tooth. But for medium-sized and small cavities, I am equally convinced from long experience and observation of my own and the work of others that no other method offers the same degree of permanency or usefulness.''

In the building or making of a contour filling a threefold division of the subject naturally presents itself.

I. The preparing of the cavity.

II. The placing therein the filling-material.

III. Finishing and polishing the completed work.

Much that may be said about the preparing of a cavity will apply to the simpler and easier operations of face and crown fillings; but this one wide difference must be constantly kept in mind, viz: as the size of the cavity increases, the difficulties and dangers increase, not proportionately, but in a geometrical ratio, and therefore a relatively greater care must be given to all the details of the larger and more complex operation. A few quick, sharp cuts will suffice for preparing a simple crown cavity, but they would fall far short of filling the bill in any case such as he proposed to consider.

As the architect or engineer sees his completed work before the actual is even started, so should the dentist be able to discern the full size, shape, and figure of his proposed restoration; and each step should be so carefully planned and made to fit the next, that in the completed whole nothing may be wanting.

The size and shape of the cavity, the proper distribution of retaining undercuts or pits so as to protect and strengthen weak walls and throw the burden on strong ones, requires good judgment. Just here may be found the cause of many failures. Undercuts are made too deep, and retaining-pits made in such positions as to either weaken the tooth or endanger the pulp. Deep undercuts, though they make the operation easier, are seldom called for, and endanger the completed work; and this they do in two ways: first, by weakening the walls, and second, by making real obstacles to forming a homogeneous, well-packed filling.

The deep undercut, though it holds the great bulk of the gold in place, is itself difficult to fill. To do so well requires much time and care, and the use of exceedingly small pluggers. Where all the walls of a cavity are standing, and the face of the tooth adjacent to the cavity is perfect, the walls of the cavity should be left as nearly parallel as possible and no pits of any kind made. In fact, nearly parallel walls should be the rule, and pits always avoided when possible.

Judgment is specially called for in those cases where the natural face or faces of the tooth have been lost, either by decay, or the too free use of the file and chisel; for, as will be referred to a little later on, in speaking of packing the gold, a point of considerable interest arises in these cases, as to whether the filling should be allowed to overlap the walls of the cavity, and simply lie against the face of the tooth on the outside, or whether it shall be made continuous with the walls of the cavity and bulge only from the cavity itself.

Believing that overlapping gold is gold in a dangerous position, he strongly advocated such a preparation of the cavity as would minimize this danger, even if by so doing the full realization of one's ideal in contouring be not carried out.

It is a sort of belief with many, that in all cases the packing of the gold should be commenced at the cervical wall or base of the cavity. This is a mistake. Oftentimes more certain and rapid work can be done by starting the filling back in the grinding-surface and building downwards, and so this point should be considered and the cavity shaped accordingly.

As the enamel forms the edges of most large cavities, its proper management is a matter of importance. He had advocated in a paper read before the New York Odontological Society the complete removal of the thin edge of enamel often found at the neck of the tooth, for the double reason that it was only slightly adherent to the dentine just there, and so liable to split off during the operation of filling, and secondly, it is very difficult to make a smooth edge on it.

Since that date he had seen no reason to alter his judgment in respect to this method of practice, but had had many confirmatory ones brought to his notice. Leaving the thin edge leaves a weak spot.

A final point to observe in shaping the cavity consists in making the edges smooth and polished; and just here the great advantage of the dental engine, with its rapidly revolving bur, comes to the front. No hand-instrument, no matter how much care is used, can compete with it. A sharp, well-cut bur will do in a few moments far more effective and perfect work than the sharpest hand-instrument can in a far longer time. If, in addition to the bur, the edges are polished with the wood point armed with powder, or still better, with an uncut round iron point armed with diamond dust, perfect edges can be quickly obtained.

The most important part of the work, and the one in connection with which probably more science and skill can be employed than in any other, are the perfect adaptation of the gold to all the walls of the cavity, and the accomplishment of this with a minimum amount of force. A third essential may be added,—that the filling be made homogeneous and solid throughout.

Imperfect adaptation makes failure almost a certainty, and undue force—any amount of force over and above that required to condense the gold—is almost equally fatal in the end. How, then, first of all, should we proceed to make the gold fit the cavity?

The quality of the gold made use of in building up a filling of this character—viz: its welding property—is one not to be lightly esteemed. It is our servant if we handle it rightly, our master if we treat it improperly.

In skillful hands pure gold is almost as pliable and obedient to the touch as the clay the sculptor uses to fashion the child of his fancy; but there is this difference: the clay can be worked over and over again,—a little added here, and taken off there,—and so long as it is kept moist it responds to the brain back of it; not so with gold. Place a bit in position in such a manner as to insure perfect contact with that already in place, and the union will be perfect, and it becomes a part of it; but this cannot be tried a second time: the first is the only one that will be allowed. If it does not take its proper position at once, something is wrong, and cannot be made right by using extra force. The moment that is done the evil that resides in the metal, and that heretofore has been dormant, manifests itself. It becomes stubborn, brittle, and cranky, and persists in doing everything except what is wanted of it. Like some individuals, it has a dual nature, and we must beware how we call out the perverse side.

Then again, the amount of force used must always be proportionate to the size of the pledget to be packed, and exactly that. Too little force fails to insure solidity, and too much has a tendency to bring out the harsh qualities alluded to. As the pledget must be packed in the exact position in which it is first placed and cannot be moved from it, great care and good judgment are required to avoid pits and to make certain that the surface is kept even, for it is much more difficult to fill a pit or sharp depression than to continue a flat surface; and the permitting of pits near the walls of the cavity is especially to be avoided, for the extra force necessary to fill them too often weakens the walls or even crumbles the enamel. So the rule to be observed is, as far as possible, to carry a uniform surface upward, and as the filling grows to keep the marginal portions a little in advance of the center.

Another advantage that results from this plan of procedure is that larger points may be used. A pit or depression near the walls necessitates the employment of small points, for the point in use must always be a trifle smaller than the pit to be filled. This suggestion is by no means an unimportant one, and a little thought will soon convince one of that fact. The correct packing of gold is in truth an art of itself, and requires an educated touch and correct eye.

Where to start a filling is a matter of some moment. It is generally commenced at the cervical wall, but cases frequently occur where the commencement may be made with advantage back on the grinding-face of the tooth, and the filling carried backward or forward to the floor of the cavity. An advantage frequently arises from this method, for by carrying it along the sides of the cavity toward the bottom any movement of the gold is avoided, and pits to accomplish this purpose are not required. Anyone who has not tried this plan will be astonished to find how frequently it facilitates the operation. Deep pits are only admissible when other means fail to accomplish their purpose.

The manner of making a filling leads naturally to a consideration of the points to be used, their shape, and the best methods of applying the force necessary for condensation of the gold. If the gold is to be built up layer by layer, in a series of plains, the thought naturally suggests itself that the shape of the points should conform to that of the plains themselves,—in fact, should have flat surfaces,—and this will be found to be a correct statement. The late Dr. Varney was the first to incorporate this principle in a series of pluggers especially intended for packing cohesive gold, and the set made from patterns furnished by him stand unequaled to this day for their splendid adaptation for contour work. The points all have plain surfaces, and are very finely and evenly serrated. Slight modifications only have been made in them since his day, so completely did he work out his theory in steel.

A round point may have some limited utility at times, but never can be relied upon to any extent. It would be a matter of the greatest difficulty to make a large, uniformly packed filling by their use only. Deep serrations are faulty in that they cut the gold and require extra power to force it into a solid.

How to apply the requisite pressure is probably the most important consideration of all,—how to apply just enough force for the purpose, and to apply it quickly, uniformly, and evenly. How to apply the *quantum sufficit*, and no more, so as to give the patient the least discomfort, and lighten the labor of the dentist, is a serious problem.

Few would seriously consider hand-pressure alone as offering the best solution. Besides being the most laborious and tedious method, it rarely produces perfect work. We cannot get along without it, especially in commencing operations ; but good judgment demands that it be supplemented by some means more under control, more direct in its action, and developing more power, and this can only be done by resorting to some one or more of the various devices which the ingenuity and thought of the profession has placed in our hands for using the power of momentum, or in plainer terms, the mallet.

The late Dr. Atkinson, whose memory we hold in respect and whose loss we deplore, was probably the first to suggest this means of obtaining the desired end, and in his hands and in the hands of his followers the hand mallet was made to do most excellent service; but it was soon found that it offered only a partial solution of the problem. To mallet for oneself was awkward and oftentimes impracticable, and it was found impossible to make two brains work in harmony. The automatic mallet in some of its various forms took its place, and will probably always retain a well-deserved place in the dentist's outfit. Then followed the electric mallet,—a step in advance, and a big one; but it had many inherent defects that greatly impeded its general adoption.

To-day the mechanical mallet is slowly but surely coming to the front, and the day is probably not far distant when it in some of its modifications will supersede all others.

Let it be premised that the more closely the force to be applied can be made to simulate hand-pressure, the better it will be in all ways,—safer for the tooth and easier for the patient to bear. This is just what the mechanical mallet does: it is pressure intermittently applied, and in nowise is to be likened to the hammer-like blow that is given either by the hand mallet, the automatic, or the electric.

If we take a look at the mechanical mallet in operation and notice how it works, we will see that the point is placed in contact with the gold and gently pushed forward. This throws the farther end of the mandrel holding the point back, so that the lug or rounded bit of steel with which the rapidly revolving wheel is armed comes in contact with it, and it is pushed forward; and this is repeated with every revolution of the wheel so that from one thousand to three thousand impulses may be given to the point every minute, the direction, number, and power of these impulses being perfectly under the control of the operator.

Dr. Allan employs the Bonwill mallet as modified by Dr. S. G. Perry and Mr. Weber. There are eighty threads to the inch in the adjusting-screw, and forty notches in the collar, so that the movement of the collar one notch brings the plugger mandrel $\frac{1}{3200}$ of an inch, or the thickness of the diameter of a human blood-corpuscle, nearer to or farther away from the revolving wheel; and yet, small as this distance is, it is distinctly appreciable to the operator and patient alike. It looks reasonable that a forward push movement of the point through these small distances must be comparatively safe and can be made to expend itself in the packing of the gold, and the packing only.

A valuable point is that where the serrations of the point are rightly made, that is, having one side longer than the other, the point travels over the surface of the filling and has simply to be guided by the operator so that if placed near the center of the filling it will move over the face of the gold in just the direction and manner required.

Thus it becomes the easiest thing in the world to pack toward the walls of the cavity. The gold is plastered into position, as it were, easily and rapidly.

The kind and quality of the push can be regulated in several ways other than by the adjustment collar. By increasing or diminishing the speed of the motor a great change is at once perceptible, and again the educated touch will hold the point against the gold so as to insure perfect packing, and no force wasted. In fact, through a wide variation of power it is under perfect control.

The finishing is a matter of detail, and often sadly neglected. Too high a polish cannot be given to the perfected work. Do the best we can, we will fall far short of nature's model. Time and labor cannot be thrown away if intelligently employed in the finishing.

In packing gold, solidity and homogeneity are essential considerations. A filling that is hard enough to resist pressure and is perfectly adapted to the walls of the cavity will prove effective, but perfect adaptation and the requisite hardness as a rule also mean homogeneity, though not always. It is not only far easier to finish a uniformly dense filling, but the work can be done in a shorter time and always in a more satisfactory manner. It is discouraging labor to attempt to put a finished surface on an imperfectly packed filling.

When a tooth has been mutilated by disease, or by the file and disk, as before mentioned, a question often arises as to whether the gold shall be allowed to overlap the edges of the cavity, or simply be rounded out from them. It is doubtful whether gold can be made to lie against tooth-substance in such a manner as to prevent the ingress of fluids. The thinner and deeper or thinner and wider the overlapping gold, the greater the doubt and uncertainty. If the diameter of the gold is one-third or one-half greater than that of the cavity, trouble is almost certain to occur in the near future.

The difficulty in making a perfect edge is also greatly increased in these cases, and so it is a safe rule to observe, to finish the gold to fit the cavity and to take the place of an overlapping lid as little as possible.

In shaping, the articulation should always be left in such a condition that the filling should in mastication be pressed back into, not out from, the cavity.

As a means of education, no method is equal to that of making fillings out of the mouth. Anyone who has not tried it will be surprised at the amount of instruction that can be acquired in this way, and in no other. Any earnest worker who makes the experiment will be astonished to find that the operation is not easy even under these simple conditions. His edges will remain imperfect, and his powders will scratch, and he will wonder how he ever succeeds in the mouth.

Dr. Allan summed up by advising that in preparing cavities care should be taken to avoid deep undercuts or pits, to make as little strain on the enamel as possible, and to make clean polished edges. In packing the gold it should be borne in mind that the filling must be homogeneous throughout, and built up in a series of plains ; and that, in finishing, nature should be imitated in the high polish put upon the work, for when we do our best we will fall far short of her beautiful handiwork. To do perfect contour work requires care and skill, and a conscientious regard for all details. With practice and experience one will be surprised to find how often the impossible becomes possible, and the difficult easy of attainment.

Dr. Allan's paper was followed by a lantern exhibit of views illustrating the different classes of gold fillings, also the mistakes of unskillful operators and the results of injudicious work. The last picture shown was a micro-photograph of a tooth-section showing the micro-organisms of decay in the dentine. This slide had been photographed with the purpose of showing the space between a carefully packed gold filling and the wall of the cavity, proving that even the best gold filling could not absolutely exclude micro-organisms.

Discussion.

Dr. J. L. Williams said in cases where it was necessary to make permanent V-shaped separations between the teeth, the wide opening in the upper teeth should be on the outside of the arch because the action of the cheeks would help to keep them clear, but in the lower teeth the wide opening of the separation should be on the lingual side, where the action of the tongue would clear it of food-particles, etc. The upper teeth extending beyond the lower ones protected them from contact with the cheeks.

Dr. J. Taft said the treatment of the borders of cavities is an exceedingly important point, and is one in which we should be guided very largely by the character of the teeth. Some teeth are very strong, well knit together, and resistant ; others will break down readily. Every cavity should be treated in reference to these characteristics. There can be no rule as to how every filling should be finished at the borders, for the quality of the tooth must control the decision of the best way. The poorer the quality, the more care and skill are required. Perfection of finish, however, should always be aimed at ; the polish should be as perfect as possible. A border of enamel should never be left unsupported, nor should the wall of the dentine be cut through in grooving.

The overlapping of a gold filling should never be permitted farther than the cutting of the enamel has extended, but it is often necessary to protect the cut surface in this way. If the filling is to be contoured, this trimmed edge must be shielded with gold, but great care must be taken to make the adaptation good. It is not enough to lay on a piece of gold and press it down with the burnisher, but the gold should be uniformly condensed so as to make it solid, and the adaptation, perfect when it is made, should be so prepared as to maintain its position. If there is any movement at all from where it is first placed, failure will ensue.

Another point in a gold filling is the necessity of thoroughly condensing every particle of gold as it is introduced. If the gold is not consolidated, then no amount of force will do it afterward, and the effort to accomplish it will probably injure the tooth.

It is important to have the foundation right, and the surface of each piece inserted must make a perfect weld with that which follows.

Dr. R. R. Andrews spoke of one of the illustrations which showed a tooth with a crown cavity filled and two cracks running through the enamel toward the neck of the tooth. He said these cracks are often defects in the enamel caused by faulty development, and that they occur very frequently. He thinks that the enamel in forming fails to flow together, but the edges meeting double in and leave the cracks.

Dr. Taft said he could bear testimony to the frequency of such defective enamel, and thought it advisable in such cases to remove a thin wall of enamel rather than to fill under it, as the dentine, with the filling over it, would be less vulnerable than the frail edge of enamel.

Dr. Allan said his judgment was not to overlap the enamel with gold, because it was impossible to make a good joint, as the gold would of course have no hold on the enamel; and as the force used to condense the gold would cause it to develop springy qualities, it would not stand when finished in even close contact with it.

(To be continued.)

ALUMNI ASSOCIATION OF THE DENTAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA.

THE eleventh annual meeting of the Alumni Association of the University of Pennsylvania was held in the Board of Trade room of the Mercantile Library building, Philadelphia, Thursday, April 30, 1891.

The meeting was called to order at 3 o'clock P.M. by the president, Dr. G. L. Hurd, Lee, Mass., who in his opening address congratulated the association on its increase in membership, and expressed the hope that every graduate of the Dental Department would enroll his name as a member, and do all in his power to promote the welfare and continued progress of his *alma mater*. He emphasized the provision of the constitution making it obligatory on members to "aid in all efforts to elevate the standard of dental education, and to extend the progress of dental science and art."

Twenty-seven new members were admitted.

The committee on alumni hall presented a report stating that they had communicated with many of the graduates and others in reference to the proposed alumni hall, and that the outlook was most encouraging. This association should have a permanent home, and the appropriate place was the university grounds. The faculty was in accord with the committee, and all that was necessary was to secure the requisite funds. Much money had been already contributed, and they solicited further donations; any amount, however small, would be gladly received and acknowledged.

Dr. U. S. G. Moore, Shamokin, Pa., read a paper entitled "A Plea for a more Popular Ministration to Children's Teeth."

Dr. Moore spoke of the increasing demand for dental services for children, due to the spread of information as to its importance. He urged the necessity of the avoidance of pain, and the establishing of a dread of dental operations which might last through life. Parents stand in need of a special education in this direction. Too often they deceive a child by assurances of freedom from pain, and expect the dentist to become a party to the deception, and thus forfeit the confidence of the little patient. He opposed the unnecessary extraction of a tooth during childhood, and urged the necessity of filling cavities in the deciduous teeth, but thought that the preparation of cavities for young children need not be as thorough as with permanent teeth, and that rather than a timid child should be made to remember with dread its first experiences in a dental chair, it would be better to be content to do as we can rather than to insist upon doing what we would. As a rule, children will not tolerate for the first few visits the employment of absorbents in the mouth, and so, as the fluids will accumulate rapidly, we must perforce in such cases make submarine fillings if we are to fill at all. We cannot expect to make theoretically perfect work for children, and fortunately we can, with intelligent care, make practically successful operations without much distress to the patient. He doubted if a cement filling was a better preservative for the margins than hard carious dentine. He thought the progress of caries would be prevented just as well, and much suffering saved to the child by less thorough excavating than we are tempted to make. Where cement fillings appear to be preserving the teeth they should be let alone; when they did not wear well, he advocated the employment of gutta-percha for approximal cavities, and amalgam for grinding-surfaces. He feared to use a phosphate capping under amalgam, or to use a phosphate filling in the deciduous teeth, because there is a perhaps well-grounded suspicion that in spite of its many good qualities the oxyphosphate may in time cause the death of the pulp near which it is placed. Where the oxyphosphate is used, he thought it better to interpose a material such as carbolic acid and chalk ; but in any event keep as far from the pulp as possible.

The sixth-year molars appear when the child still requires gentle handling, and these teeth are frequently so imperfect as to render them prone to caries, and so soft and sensitive that the plastics are imperatively demanded in their first treatment. Unfortunately, the child's first introduction to the dentist is often brought about by the aching of one of these teeth, which has been allowed to decay because it was supposed by the parents that it belonged to the first set, and it generally requires no small amount of effort to convince them of their error and of the necessity for their preservation. The value of these first molars, and the pain inflicted by their extraction in childhood, make it desirable that they should have intelligent treatment to secure their retention. Happily, they can generally, if not too far decayed, be preserved by careful temporary stopping.

In conclusion, Dr. Moore urged the necessity of earnest and conscientious effort to save both the feelings and the teeth of children ; that though such service is not always agreeable, but often exacting and fatiguing, the reward of patience, kindliness, and skill will be fully appreciated by the patients in after-life.

Dr. George G. Milliken, Philadelphia, then read a paper on "Neuralgia," of which the following is an abstract :

The condition of the teeth as a factor in the causation of facial and cranial neuralgia has certainly not received the attention which it merits, either from dentists or physicians. It must be admitted, however, that the physician has been much less to blame than the dentist. Our medical brethren depend on us for correct information as regards the condition of the teeth, but generally attach too little importance to these organs in making their diagnosis. Few people ever think of consulting the dentist regarding facial or cranial neuralgia, and comparatively few dentists in examining a mouth and finding apparent cause for reflex troubles inquire concerning such disturbance.

The medical profession has left the care of the teeth to dentists, but they do not seem, as a rule, to appreciate the opportunities that are offered them by the default of the medical attendant to demonstrate the relation of facial and cranial neuralgia and other reflex troubles as dependent upon dental lesions. Either the dentist must become a dental neurologist and expert, or else the medical specialist will be obliged to occupy the ground, and so crowd the dentist into a narrow and subordinate position.

There can be no doubt that diligent investigation and study in this line will bring its reward, and the distinction of adding valuable contributions to neurological science.

In illustration of the fact that sympathetic relations exist between the teeth and other and sometimes distant organs, he gave the details of two cases.

A patient for whom he had done considerable work complained that her eye-glasses were out of focus, and stated that her eyes pained her, feeling as though leaden weights were tied to each eyeball, and that she had a constant headache in the supra-orbital region. He advised her to go to her optician, which she did, and he informed her that her eyes required a change of glasses. On consulting her oculist she received the same assurance, and made an appointment with him. In the mean time, having finished up whatever seemed to require attention in her mouth, Dr. Milliken discovered in making a final exploration a minute cavity in the upper right wisdom-tooth, and on excavating it found that the entire inside of the tooth had decayed, leaving merely a shell of enamel filled with decayed dentine. As the tooth had no antagonist, he persuaded her to have it extracted. The result was that the headache, together with the eye-trouble, disappeared within a few hours, and although three years have elapsed there has been no return of the symptoms.

Another case was that of a young man who was troubled with paroxysms of intense headache, accompanied with severe retching and vomiting. These attacks recurred at intervals of about a week or ten days, and were so severe that he would be completely prostrated, and was compelled to remain in bed until the paroxysms passed off. Having consulted several physicians, and having had his eyes tested and glasses adjusted without relief of the disturbances, he was advised to have his mouth examined. He stated that he had never had any trouble with his teeth, and did not think that they could be the cause of his sick headaches. An examination revealed two small cavities in the superior bicuspids, and two very innocent-looking amalgam fillings in the twelfth-year molars. These were removed. The pulp-chambers had been invaded and a piece of absorbent cotton placed over them without any attempt to clean out the canals. After treatment and refilling the symptoms disappeared, and have not since returned.

These belong to a class of cases that lie fairly within the province of the dentist, and which the skilled dentist alone is capable of curing.

Among the causes of facial and dental neuralgia that immediately concern dentists—those which are of peripheral origin—may be put down first and foremost unskillful dentistry. Capped pulps or pulps that have become irritated under improper fillings; dying or dead pulps giving rise to suppurating foci, the products of which are either discharged into the mouth or absorbed into the system ; fillings that allow the secretions of the mouth to permeate into the tooth-structure beneath them ; teeth that, owing to the crowded condition of the arch or to malposition, are unable to erupt ; improper occlusion of the teeth ; exostosis ; pericementitis ; inflammation of or receding gums ; teeth without antagonists ; acidity of the secretions of the mouth, are all fruitful sources of neuralgia and of reflex disturbances in proportion to their extent, the systemic condition of the patient, and his susceptibility to such influences. Some individuals are more susceptible than others to sympathetic or reflex disturbances. Some have what is known as the neuralgic diathesis. Sex also has a decided influence ; females are more predisposed to neuralgic affections, owing probably to the greater susceptibility and higher tension of the nervous system, more especially during the period of sexual activity.

Excesses of all kinds, wasting diseases, anæmia, disturbances of nutrition, malaria, and perverted conditions of the blood generally, are all potent predisposing causes. These act by weakening the resisting powers and producing a morbidly sensitive condition of the nervous system.

Neuralgia shows itself usually in paroxysms, and may recur regularly and at fixed intervals, in which case there is generally a malarial influence. More frequently the paroxysms occur at irregular intervals, and may be due to some indiscretion in diet, exposure to solar heat or to cold, mental anxiety, or overwork.

The diagnosis of neuralgic cases is often difficult, and in the majority of cases there are no positive rules as guides. A lady had once called on him in regard to severe headaches with which she constantly suffered. She had been treated for the trouble by a physician, who, failing to relieve her, had referred her to an oculist, and he in turn failing had recommended her to have her teeth examined. The existence of a number of carious and dead teeth seemed to offer a solution of the problem ; these were treated and filled with no relief until there remained but one cavity that needed attention, but on the filling of that last tooth the headaches yielded.

Patients with neuralgia seldom complain of toothache, and frequently in severe cases the teeth, although alive, will respond feebly, if at all, to heat and cold tests. This may lead to error in the supposition that they are dead ; but as the neuralgia succumbs to treatment, these teeth rapidly resume a normal condition.

The dental causes of neuralgia should be borne in mind and their occurrence prevented. If a pulp has been capped, that tooth should be tested from time to time. The same rule will apply to teeth with large metallic fillings ; pulps in such cases often die without giving any evidence whatever of local trouble.

As to curative treatment, examination of the teeth should be made and the mouth put into a thoroughly hygienic condition. The constitutional condition should be carefully studied, and appropriate treatment directed for such derangements as may aggravate neuralgic tendencies. Diet, clothing, exercise, bathing, sleep, the avoidance of anxiety, overwork, etc., should all be considered, as anything that lowers the tone of the system will tend to produce a recurrence of the paroxysms.

The treatment during the paroxysms may be both local and systemic. Hot applications, counter-irritation, or local injections are sometimes sufficient. Systemic treatment must depend upon the diagnosis of the cause.

Dr. Louis Stephan, Milwaukee, Wis., read a paper entitled "Filling Teeth over Exposed Pulps, and Filling Root-Canals."

Dr. Stephan described the various causes exciting odontalgia, and the treatment,—varying according to cause. Of capping following exposure of the pulp, he believes that in most cases of recent exposure in which the tooth has not ached, judicious capping will save the life of the pulp. He uses a paste of oxide of zinc, oil of cloves, and carbolic acid, applying it without pressure, and covering with a platinum cap, filling with a non-conductor. He disapproves of oxychloride of zinc as a pulp-capping, but approves of its use as an intermediate filling. He believes that the use of oxyphosphate of zinc in cavities near the pulp has a tendency to destroy the vitality of the organ. He gave in detail his methods of treatment in the several varieties of pulp-exposure and exposure complicated by pericementitis, and rules for diagnosis in cases of reflex pain, with directions for the preparation and filling of pulp-canals. He advocated the use of carbolic acid applied on a pledget of cotton at the apical foramen to prevent putrescent matter being forced through, and the employment of dry heat as one of the best germicides. He objected to the use of bichloride of mercury in the treatment of pulp-canals, because of the liability of forming a mercurial sulphide, the black precipitate being liable to discolor the tooth. He considers the two most important materials for filling canals to be oxychloride of zinc for teeth in the inferior jaw, and gutta-percha for the superior.

Dr. H. L. Smedley, Media, Pa., read a paper entitled "How shall we teach Medical Men to properly treat Alveolar Abscess?"

All dentists were painfully aware of the too common disfigurement arising from medical interference in these cases. While it is unquestionably the province of the physician to treat ailments of all parts of the body, he maintained that no one should attempt to treat cases of alveolar abscess who had not provided himself with the proper instruments and gone through the proper course of instruction necessary for an intelligent comprehension of the lesion. There had been many instances of permanent disfigurement arising from the ill-judged remedial measures applied by physicians, while if the cases had been treated by a competent dentist, in the light of the knowledge acquired by his special training, the cure would have been effected without these after-results. Doubtless there are many instances in which medical treatment was an important factor, and he did not object to consultation with physicians on this point, but he protested against the view that a merely medical training qualified a physician to treat these cases satisfactorily.

Dr. Samuel Goldsmith, New York, in opening the discussion, referred to the recent correspondence in the *New York Medical Journal* between Drs. Rhein and McPherson on the subject of alveolar abscess, in which Dr. McPherson claimed that extraction was a radical cure for the disease. A perusal of the correspondence would make it evident that there was need for further study of the subject by medical men.

Dr. M. L. Rhein, New York, had been much interested in Dr. Milliken's admirable paper on neuralgia. The subject should command our earnest attention. Last year he had taken part in a discussion before the New York Academy of Medicine on the results of peripheral irritation. The discussion extended over three or four meetings, and was participated in by different specialists—gynecologists, ophthalmologists, dentists—and by general practitioners. As to the articles in the *New York Medical Journal*, referred to by Dr. Goldsmith, it had seemed to him ill advised in Dr. McPherson to publish in a medical journal a method of treating alveolar abscess by obsolete methods, and he considered it his duty as a dentist to reply. If medical men want to practice in these cases, they should first acquaint themselves with modern methods, and should not be permitted to teach erroneous doctrine without an attempt to correct them.

Dr. W. H. Rehfuss, Philadelphia, said the importance of prophylactic measures in the prevention of caries cannot be overestimated. The question is, How shall a dentist best educate the public and his patients? The platform and the newspaper are not available. The groundwork for the education of the public must lie in the college training received by the dental student. Proper instruction should be given parents as to the use of phosphates in the dietary, regular examinations of the teeth, use of the brush, etc. Dr. Milliken's paper, he thought, was a valuable contribution ; the subject was presented in a somewhat different light than usual, and the treatment recommended was simple and easily carried out.

Dr. M. L. Rhein, referring to Dr. Stephan's use of bichloride of mercury in root-canals, said that he could not agree with the essayist, and he felt sure that with more experience in the use of germicides Dr. Stephan would change his views. The use of carbolic acid in root-canals was now practically abandoned, for reasons given in Dr. A. W. Harlan's articles on coagulants. No coagulant should be used for this purpose ; as soon as you coagulate the canaliculi, all further treatment is useless. He has used bichloride of mercury and peroxide of hydrogen in root-canals for the last six years, and has never produced discoloration. Permanent good results have been attained with these remedies in many badly discolored teeth.

Dr. James Truman, being called on, expressed his interest in the papers and discussion. He was glad to see that the association was growing in the right direction, not only in numbers but in scientific work. He did not agree with Dr. Rhein as to the effect of coagulants on root-canals, and disputed the correctness of many of Dr. Harlan's theories as to the action of these agents. He said the paper on neuralgia showed evidence of careful study, and the treatment recommended was judicious.

The annual oration, by Dr. M. L. Rhein, was on motion postponed until the banquet, to be held in the evening.

The following were elected officers for the ensuing year : B. F. Place, Norristown, Pa., president ; Grafton Munroe, Springfield, Ill., first vice-president ; W. J. Turner, Brooklyn, N. Y., second vice-president ; W. H. Trout, Landisville, Pa., third vice-president ; W. L. Winner, Philadelphia, recording secretary and treasurer ; H. B. McFadden, Philadelphia, corresponding secretary. C. A. E. Codman, Philadelphia; L. Foster Jack, Philadelphia; J. C. Hertz, Easton, Pa. ; Ambler Tees, Jr., Philadelphia ; Boyd H. Baker, Hughesville, Pa., executive committee. O. J. Eagan, Fall River, Mass., orator.

The association then adjourned.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held its annual meeting Tuesday evening, April 14, 1891, in the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. J. F. P. Hodson, in the chair.

Dr. Sherman B. Price, of the Clinic Committee, read the following

Clinic Report.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Co., Broadway and Ninth street. The number in attendance was one hundred and seven. . . . Dr. A. P. Burkhart, of Dansville, N. Y., gave a clinic upon the use of tin and gold, filling a compound cavity in a right superior second bicuspid, on its anterior and crown surfaces, using a matrix for the upper third of the cavity, which he filled with Slater's fibrous tin, and finishing with gold in the usual manner. The result was a very handsome stopping. . . . Dr. J. A. Canaday, of Albany, N. Y., filled a left superior second bicuspid crown cavity with tin and gold, using No. 4 S. S. White globe foil and No. 4 tin. A sheet of tin was placed upon a sheet of gold, and folded four times so as to leave the gold on the outside. This was cut in strips, and the filling condensed with the electric mallet. For soft teeth and in deep cavities where thermal changes are to be guarded against, and the avoidance of much pressure is desired, this combination of materials would seem to work very satisfactorily. . . . Dr. H. J. Hull, of New York City, demonstrated the filling of root-canals with gold on a left inferior sixth-year molar, the anterior corner of which was entirely broken away. The roots had been thoroughly medicated, and as a final application before filling they were washed out with alcohol and creasote and then thoroughly dried. The gold was prepared by cutting into narrow strips about one-eighth of an inch long by one-sixteenth wide, and wrapping them around a square-edged Swiss broach, by means of which the gold was carried to the apex of the root and thoroughly packed. The operation proved very satisfactory. . . . Dr. George Evans, of New York City, demonstrated the principles and methods of treatment of pulpless teeth, using heat and antiseptics which are non-coagulants of albumen, as advocated by Dr. A. W. Harlan. . . . Dr. C. C. Carroll, of the Carroll Aluminum Manufacturing Company, gave an interesting demonstration of his method of making aluminum cast dentures. After the preliminary work of fitting the temporary base-plate, the cast is invested in a flask which is placed in an automatic gas-furnace, which consists of a double oven heated by a gas-jet ; the lower oven is at a temperature of 1300°, and the upper at 1200°. The flask is placed in the upper oven, and the crucible containing the metal in the lower. After the aluminum has melted, the flask and crucible are taken out of the furnace, and a tube, upon the end of which is a rubber bulb, is attached to the crucible, which is placed over the small opening of the flask. The bulb being compressed, the metal is forced into the flask. After cooling, the plate is removed from the flask and trimmed. The teeth may then be attached in the usual manner by vulcanizing, or to the metal base in the process of casting as described. Dr. Carroll also showed his aluminum amalgam, for which he claims non-shrinkage, density, and superior edge-strength, and that it will not oxidize. The specimens shown had a beautiful white luster, though kept in a box containing a silver quarter of a dollar and a piece of erasing rubber. The coin was tarnished, but the aluminum stoppings were not affected by the action of the sulphur from the rubber. . . . Dr. Hardy, of New Jersey, presented for consultation a gentleman of about fifty years of age, who had lost from necrosis all of his teeth from the cuspid back on the left side of the lower jaw. The right side began to give trouble a few days ago, and upon examination Dr. Hardy found a loose piece of bone in the space between the second bicuspid and third molar, where the teeth were missing. An opening of about one-half to three-quarters of an inch presented. Several suggestions were offered : one to cut down to the bone and bur off the edges, another advised the use of aromatic sulphuric acid. The patient, having suffered so much from former operations, decided for himself to adopt the latter treatment.

After the reading of the annual reports, the following officers were elected for the ensuing year : Norman W. Kingsley, president ; V. H. Jackson, vice-president ; Benj. C. Nash, secretary ; John I. Hart, treasurer ; J. Bond Littig, librarian.

Delegates to the State Dental Society : for four years, M. L. Rhein and John H. Meyer ; for two years, Kasson C. Gibson.

Standing committees were appointed by the chair : Executive Committee, R. Ottolengui, chairman ; M. L. Rhein, Geo. H. Winkler. Clinic Committee, F. A. Roy, chairman ; Louis C. Le Roy, H. H. Sisson.

B. C. NASH, *Secretary.*

FOURTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE Fourth District Dental Society of the State of New York held its twenty-third annual meeting in Schenectady, N. Y., April 9, 1891.

The meeting was the largest and most enthusiastic in the history of the society. Eight new members were received.

Resolutions were adopted expressive of the sense of the society in reference to the death of Dr. William H. Atkinson, to his social and moral qualities, and to the great service which he had rendered dental science and art.

The following officers were elected for the ensuing year : O. J. Gross, of Schenectady, president ; W. E. Lansing, of Gloversville, vice-president ; A. C. Rich, of Saratoga Springs, secretary ; and J. H. Collins, of Granville, treasurer.

The next annual meeting will be held in Schenectady during the month of April, 1892.

A. C. RICH, *Secretary*,
Saratoga Springs, N. Y.

SOUTHERN MINNESOTA DENTAL SOCIETY.

THE annual meeting of the Southern Minnesota Dental Society was held at Mankato, Minn., April 21, 22, 23, 1891.

The following officers were elected for the ensuing year: C. D. Snow, Mankato, president; L. P. Leonard, Wauca, vice-president; W. D. James, Tracy, secretary; S. Bond, Anoka, treasurer.

The next meeting will be held at Mankato, beginning on the second Tuesday in April, 1892, and its sessions will continue for three days.

W. D. JAMES, *Secretary*, Tracy, Minn.

HARRIS DENTAL ASSOCIATION.

THE twenty-fourth annual meeting of the Harris Dental Association was held at the office of Dr. Amer, Lancaster, Pa., May 7, 1891.

The following officers were elected for the ensuing year: J. A. Martin, president; D. R. Hertz, vice-president; Wm. N. Amer, secretary, and H. D. Knight, treasurer.

WM. N. AMER, *Secretary*, Lancaster, Pa.

AMERICAN DENTAL ASSOCIATION.

THE thirty-first annual meeting of the American Dental Association will be held at Saratoga Springs, N. Y., commencing Tuesday, August 4, 1891, at 10 o'clock A.M.

GEO. H. CUSHING, *Secretary*,
No. 96 State street, Chicago, Ill.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE eighth annual meeting of the National Association of Dental Faculties will be held at Saratoga Springs, N. Y., on Saturday, August 1, 1891, at 10 o'clock A.M.

Applications for membership must be in the hands of the executive committee, Dr. J. Taft, chairman, sixty days prior to the meeting.

Each delegate must be a member of the teaching faculty in the college he represents, and bring a certificate signed by the president (or dean) and secretary, stating that he is authorized to act for them.

Delegates must be in attendance promptly at 10 A.M. on the day of meeting, in order that all the business may be concluded before the meeting of the American Dental Association, August 4.

J. D. PATTERSON, *Secretary*,
Keith & Perry Bldg., Kansas City, Mo.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE National Association of Boards of Dental Examiners will hold its annual meeting at Saratoga Springs, N. Y., on Monday, August 3, 1891, at 10 A.M.

It is important that the board of every State in the Union that has a law regulating the practice of dentistry be as fully represented as possible. This association has immense responsibility, and it ought to have the benefit of the wisest and most discreet counsel possible. It is hoped that every board having membership in this body will be represented, and that those that have not yet become members will certainly do so at this meeting. Matters of great interest and importance will come before the meeting.

J. H. MARTINDALE, *Secretary*,
Masonic Temple, Minneapolis, Minn.

WISCONSIN STATE DENTAL SOCIETY.

THE twenty-first annual meeting of the Wisconsin State Dental Society will be held at Eau Claire, Wis., commencing Tuesday, July 21, and ending July 24, 1891.

Members of the profession are cordially invited to attend.

CLAUDE A. SOUTHWELL, D.D.S., *Secretary*,
No. 411 National ave., Milwaukee, Wis.

NEW HAMPSHIRE DENTAL SOCIETY.

THE fifteenth annual meeting of the New Hampshire Dental Society will be held in Concord, N. H., June 15, 16, and 17, 1891.

Efforts are being made to make this the most interesting meeting ever held by the society. Members of the profession are earnestly invited to attend.

EDWARD B. DAVIS, D.D.S., *Secretary*,
Concord, N. H.

INDIANA STATE DENTAL ASSOCIATION.

THE thirty-third annual meeting of the Indiana State Dental Association will be held in Indianapolis, commencing Tuesday, June 30, 1891. Members of the profession are cordially invited to attend.

The State Board of Dental Examiners meets at the same time and place.

R. W. VAN VALZAH, *Secretary*,
Terre Haute, Ind.

MINNESOTA STATE DENTAL ASSOCIATION.

THE Minnesota State Dental Association will hold its regular annual meeting in St. Paul, Minn., July 8, 9, and 10, 1891.

L. D. LEONARD, *Secretary*,
No. 73 Syndicate Block, Minneapolis, Minn.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

THE Pennsylvania State Dental Examining Board will hold the regular annual meeting July 14 and 15, 1891, in Justi's Hall, Thirteenth and Arch streets, Philadelphia, Pa.

Candidates for examination are requested to be present on the first day of the meeting and promptly call on the president or secretary. Before that time communications may be addressed to the secretary.

W. E. MAGILL, *President*, Erie, Pa.
J. C. GREEN, *Secretary*, West Chester, Pa.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry, for examination, will be held in Boston, Thursday, June 18, 1891, at Dr. Shepard's office, No. 274 Boylston street, at 10 A.M.

E. V. McLEOD, *Secretary*,
New Bedford, Mass.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

AT a meeting of the Alumni Association of the Philadelphia Dental College, held April 9, 1891, all the graduates of the college during the years '86, '87, '88, '89, '90, and '91 were elected members. Those desiring to accept such membership will please send to J. R. C. Ward, D.D.S., treasurer, 1905 Fairmount avenue, Philadelphia, Pa., their name, address, and one dollar entrance fee.

L. ASHLEY FAUGHT, *Secretary*.

PROCEEDINGS NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

A COPY of the official proceedings of the National Association of Boards of Dental Examiners for 1890 will be sent to anyone interested, upon application to the undersigned.

J. H. MARTINDALE, *Secretary and Treasurer*,
Masonic Temple, Minneapolis, Minn.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

THE twelfth annual commencement of the Department of Dentistry of the University of Pennsylvania was held, in connection with that of the medical department, at the American Academy of Music, Philadelphia, Pa., on Friday, May 1, 1891, at 12 o'clock M.

The valedictory address was delivered by James Tyson, M.D., Professor of Clinical Medicine.

The number of matriculates for the session was two hundred and six.

The degree of D.D.S. was conferred on the following graduates by William Pepper, M.D., LL.D., provost of the university :

NAME.	STATE OR COUNTRY.
W. Lynn Adamy	New York.
R. Antoine, M.D.	Austria.
W. T. Arrington, Jr.	Tennessee.
Myron Barlow	Massachusetts.
Geo. M. C. Barnard	Massachusetts.
Charles H. Barnes	Pennsylvania.
A. H. Beers, M.D.	Canada.
H. Boennecken, M.D.	Germany.
Warren E. Booker	Massachusetts.
Arturo Borja	Mexico.
Wm. I. Brenizer	Ohio.
Oswald M. Brown	Illinois.
James R. Burnett	Illinois.
Frank L. Caldwell	New York.
Obe B. Caldwell	Kentucky.
Elliott R. Carpenter	Michigan.
H. E. Chesebrough	New York.
Charles P. Chupein	Pennsylvania.
H. B. Clearwater	Pennsylvania.
Arthur Brooks Cox	Australia.
William H. Cregan	Massachusetts.
James S. Darragh	Pennsylvania.
Charles H. Davis	Pennsylvania.
Charles H. Dilts	New Jersey.
Aug. H. Dreher	North Carolina.
Theodore S. Fay	Germany.
Edward Fetscherin	Switzerland.
J. Milton Fogg	Pennsylvania.
George J. Frey	New York.
C. Franklin Gibbs	Connecticut.
William J. Giles	Canada.
Edson M. Green	Pennsylvania.
Samuel S. Haines	New Jersey.
William H. Haines	Ohio.
Karl Hampe	Germany.
Thomas Holder	New Hampshire.
Fred. B. Howe	New York.
Sidney F. Jacobi	Indiana.
Edward V. Larkin	Pennsylvania.
Henry M. Laros	Pennsylvania.
M. W. Levkowicz	Costa Rica.
Frederic W. McCall	New York.
J. Atkinson McKee	Pennsylvania.
Michael Maguire	Pennsylvania.
J. F. Mayer	Pennsylvania.
Archibald Miller	Pennsylvania.
John Henry Müller	Switzerland.
Frank L. Naramore	South Carolina.
Patrick J. O'Connor	Pennsylvania.
Louis E. de la Ossa	U. S. of Col.
Richard B. O'Sullivan	Canada.
Geo. Janvier Paynter	Pennsylvania.
Alfred H. Porter	Australia.
Frank C. Porter	England.
Leon E. Putnam	Pennsylvania.
Louis E. Rauch	Pennsylvania.
Charles A. Rice	New Jersey.
Louie J. Rounds	New York.
Jacques Rüssli	Switzerland.
Earle J. Sallada	Pennsylvania.
B. F. Sayres	Pennsylvania.
Ernst Schiffmann	Switzerland.
Joseph W. Schwacke	South Carolina.
William A. Siddall	Ohio.
Fred A. Smith	New York.
Julian Smith	New York.
Wm. C. Speakman	Delaware.
Louis J. Stephan	Wisconsin.
Giovanni A. Stoppani	Switzerland.
Charles H. Tillotson	Illinois.
Chas. J. Tinkham, Jr.	Illinois.
Wm. B. Townsend	Pennsylvania.
Robert W. Volk	Massachusetts.
Clarence V. Watts	Iowa.
Wm. H. Waugaman	Pennsylvania.
Theo. H. Whitbeck	New York.
Elmer B. White	New York.
C. H. Wilson	Pennsylvania.
John C. Wiltbank	Delaware.
Geo. F. Woodbury	Pennsylvania.

DEGREE CONFERRED JUNE 5, 1890.

Milton H. Evans	Pennsylvania.
Clarence M. Root	New York.
Edward E. Rossbach	Germany.

NORTHWESTERN COLLEGE OF DENTAL SURGERY.

THE eighth annual commencement exercises of the Northwestern College of Dental Surgery were held at the college building, 1203 Wabash avenue, Chicago, Ill., on Tuesday evening, March 31, 1891.

The doctorate address was delivered by Professor C. G. B. Klophel, M.D. ; the valedictory address by William S. Milligan, D.D.S.

The degree of D.D.S. was conferred on the following graduates by Professor R. W. Clarkson, dean of the college :

Jas. Sampson Goodridge	England.
George Michael Honlihan	Wisconsin.
Wm. Savage Milligan.	Pennsylvania.

The honorary degree of D.D.S. was conferred on Richie DeLan, of Massachusetts.

UNITED STATES DENTAL COLLEGE.

THE first annual commencement exercises of the United States Dental College were held at the Auditorium, Chicago, Ill., Thursday, March 26, 1891. The opening address was made by Dr. J. J. M. Angear ; the valedictory was delivered by H. Barry Millican, D.D.S., and an address was also delivered by Dr. G. Frank Lydston. The degree of D.D.S. was conferred on the following graduates :

Edwin Burke.
William M. Evans.
Park B. Leason.
H. Barry Millican.
Paul A. Piehl.
Gideon A. Price.
John C. Prill.
F. F. Scherman.
Emil Seghers.
William H. G. White.
F. J. Warrenfells.

AMERICAN COLLEGE OF DENTAL SURGERY.

THE fifth annual commencement exercises of the American College of Dental Surgery were held at Central Music Hall, Chicago, Ill., on Tuesday, March 24, 1891. The valedictory was delivered by F. P. Burchell, D.D.S., and the doctorate address by I. Clendenen, M.D., D.D.S. The degree of D.D.S. was conferred on the following graduates by L. D. McIntosh, M.D., D.D.S., president of the college :

William Bruening.
Miss A. S. Bowers.
F. P. Burchell.
Chas. P. S. Beerend.
George G. Barlow.
W. T. Buchanan.
F. B. Crooker.
Francis A. Carter.
L. T. Creighton.
Charles E. Douglass.
J. F. Eldred.
William Frackelton.
Joy L. Frink.
J. A. Garland.
W. F. Gilroy.
J. S. Goodmanson.
H. Hulsebusch.
F. R. Howdle.
F. B. Hinchman.
William J. Jefferson.
Ernest A. Kohler.
Matthew Kalt.
Frank J. Kyler.
R. M. McKey.
Henry W. McIntire.
F. A. V. Moller.
William Mitchell.
C. McCarty.
Mrs. H. C. Magnusson.
P. S. McKenzie.
Watson Martin.
W. F. Reber.
T. J. Randall.
T. Rogers.
W. C. Stanfield.
G. A. Stevenson.
George Steele.
Aleck M. Swann.
Frank J. Shea.
Henry Suesskind.
Frank H. Stafford.
Sterling D. Tuttle.
N. Huston Teal.
Henry C. Waack.
P. E. Walter.
J. W. White.
Mrs. M. Wiede.
H. Wiede, M.D.
C. E. Ward.

COLLEGE OF DENTISTRY OF THE UNIVERSITY OF DENVER.

The third annual commencement exercises of the College of Dentistry of the University of Denver were held, in connection with those of the medical and pharmaceutical departments, at the Trinity M. E. Church, Denver, Col., on Tuesday evening, April 14, 1891.

The annual address was delivered by J. C. Davis, M.D. The charge to the graduating class was given by P. T. Smith, D.D.S., dean.

The number of matriculates for the session was thirteen.

The degree of D.D.S. was conferred on the following graduates by Chancellor McDowell, of the University of Denver:

William A. Armstrong	New York.	John S. Donaldson	Colorado.
Robert S. Clarke	Illinois.	Edwin C. Hember	England.
James R. Donaldson	Colorado.		

UNIVERSITY DENTAL COLLEGE.

The commencement exercises of the University Dental College, Department of the Northwestern University of Chicago, were held in connection with the Medical Department, Chicago Medical College, at Central Music Hall, Chicago, Ill., on April 28, 1891, at 2.30 P.M.

The degrees were conferred upon the graduating classes by President Henry Wade Rogers, LL.D., and the doctorate address was delivered by Prof. N. S. Davis, Sr., dean of the medical faculty.

The following is the list of the dental graduates:

Ellsworth Goldthorp	Iowa.	Alexander C. Murchison	Illinois
William E. Harper	Illinois.	William B. Winget	Illinois.

EDITORIAL.

THE RELATION OF THE GENERAL TO THE SPECIAL.

One of the most difficult problems in education is to impress the learner with the importance of a thorough comprehension of the underlying laws or principles on which, and on which alone, can a solid superstructure be erected.

The child does not, cannot, comprehend the value of elementary instruction; utterly fails to recognize that in learning grammar he is acquiring the science that regulates human language. Every teacher must have experienced the drudgery of trying to instill elementary principles until the learner realizes that these are the lower steps of the ladder, and essential to its ascent.

The student chafes over the uninteresting details which he is expected to master, nor grasps the fact that no real advance is possible without familiarity with basal truths and principles. To this account is chargeable the fact that the majority in every pursuit of life are handicapped by an insufficient knowledge. To this account is due the fact that so large a proportion of those engaged in the practice of the so-called learned professions are mere routinists, doing that which they were taught to do in student days, and in ignorance of the reason why. They acquired learning without obtaining the wisdom which Solomon recognized as the chief end of instruction,—"With all thy getting, get understanding." In later life, realizing their deficiencies, they hesitate to ask enlightenment through fear of exposing their ignorance, and thus remain in darkness.

There is, there can be, no scientific vitality nor scientific advancement in any pursuit except its followers be grounded in scientific soil. Practice must be based either on general broad and comprehensive principles, or on formulæ prescribing a definite routine, the resulting skill being the demonstration of an aptness for "following copy,"—an empirical, not a scientific art. It has been well said that "to accept as true what established authority says is true, and to store up such statements in the mind by an effort of memory, is the kind of training which principally prevails ;" and it must be added, this is the kind of teaching most desired by the average college matriculate.

The value of pure science, the relation of the general to the special, is not appreciated as it should be ; and until teachers and scholars alike concern themselves to a greater extent with true scientific culture, will the graduates of our schools be copyists and routinists.

To apply these observations to dental teaching : while it is true that methods have to be taught, that clinical instruction is necessary, practical training an essential feature in the college curriculum,—and of these there has not been more than enough,—yet it is doubtless true that there has not been that systematic and thorough scientific training which is needed to make scientific practitioners.

The fundamental requisite is a higher standard of admission, the recognition that a college for the education of specialists is not the place in which elementary instruction in general principles is to be afforded, but for the teaching of the application of the general to the special.

If the student of to-day is willing that his professional acquirements shall find their limitation inside the lines of manipulative ability, or if dental colleges are willing that such ability shall be recognized as a satisfactory preparation for the practice of dentistry, that higher education and wider culture are not necessities,—if mechanical and artistic ability are esteemed all that is necessary,—they fail alike to appreciate its legitimate province and the requirements for its intelligent practice. An undue estimate of the science or the art to the undervaluing of the other, is a mistake on the part of either teacher or student. The only safe ground is art founded on science, on a thorough appreciation of the relation of the general to the special.

THE SUPREME COURT TOOTH-CROWN DECISION.

In the Dental Cosmos for March, 1887, there was published an abstract of the decision of the United States Circuit Court for the Southern District of New York, concerning four patents relating to improvements in the dental art, on suits brought by the International Tooth Crown Company, and which were claimed to have been infringed. The patents in suit were as follows: To James E. Low, March 15, 1881, No. 238,940, known as the Low bridge; to Cassius M. Richmond, May 22, 1883, No. 277,941, known as the Richmond crown; to A. S. Richmond, May 22, 1883, No. 277,933, claimed as an improvement on the Low bridge; to Cassius M. Richmond, May 22, 1883, No. 277,943, on the preparation of roots.

The validity of the first named, the Low patent, was sustained; the other three were declared invalid.

The history of this litigation shows that Dr. Richmond having sold his crown patent to Dr. Sheffield, one of the incorporators of the International Tooth Crown Company, and taken a license under it, was, in default of payment of license fees, sued as an infringer of his own patent.

Another suit having been brought against Dr. Gaylord, of New Haven, for infringement of patents owned by the International Tooth Crown Company, a consolidation of the two cases was effected, and the issue was tried on its merits to test the validity of the four patents named, with Dr. Gaylord as the principal defendant.

An association of dentists was organized in New York, under the leadership of Dr. A. L. Northrop, which assumed the defence of the suit. The case was argued before Judges Wallace and Shipman, with the result as stated above.

An appeal was taken by the Crown Company to the Supreme Court, as to the two patents to C. M. Richmond. The defence was conducted by the association of New York dentists referred to, assisted by the counsel of the Dental Protective Association.

The Supreme Court has sustained the action of the Circuit Court declaring invalid the C. M. Richmond patents, Nos. 277,941, and 277,943, which are now public property. The Low patent and the A. S. Richmond patent had not been appealed, and were not before the court. The former, therefore, is in force, and the latter remains invalid by the decree of the Circuit Court, the decision in both these cases being, however, subject to revision by the Supreme Court on appeal.

In a subsequent issue we shall present more specifically the details involved in the decision, in order that the profession may be fully informed in the premises.

BIBLIOGRAPHICAL.

RUBBER HAND STAMPS, and the Manipulation of Rubber: A Practical Treatise on the Manufacture of India-Rubber Hand Stamps, Small Articles of India-Rubber, the Hektograph, Special Inks, Cements, and Allied Subjects. By T. O'CONOR SLOANE, A.M., E.M., Ph.D., author of "Home Experiments in Science," etc. Fully illustrated. 12mo, 146 pp. New York: Norman W. Henley & Co., 1891. Price, cloth, $1.00.

This little volume is filled with useful and practical information concerning rubber, its sources, collection, properties, manufacture, curing and vulcanizing processes, its preservation and renovation, solutions and cements, and directions for the manufacture of various small articles of rubber. It should be worth its cost to any dental mechanician.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Third Series. Volume XII. Philadelphia: printed for the College, 1890.

The value of this annual volume of transactions is too well known to call for comment. This issue contains the papers read before the college from January to December, 1890, inclusive, and has been edited by Dr. J. P. Crozer Griffith. The usual lists of officers, fellows, etc., are given, with the annual address of Dr. Agnew, the president, and biographical sketches and memoirs of recently deceased members. Some eighteen papers with the discussions thereon make up the bulk of the volume. Several of the papers are illustrated.

PAMPHLETS RECEIVED.

W. D. Miller, A.B., Ph.D., M.D., D.D.S. (with a Portrait). By W. C. Barrett, M.D., Buffalo, N. Y. Reprinted from the *Dominion Dental Journal*, Toronto, March, 1891.

A History of Two Hundred and Fifty Cases of Excision of the Superior Maxilla, by Joseph D. Bryant, M.D., New York. Reprinted from the Transactions of the Medical Society of the State of New York, February, 1890. Philadelphia: Wm. J. Dornan, 1890.

Ueber die Behandlung cariöser Approximalflächen an Molaren und Bicuspidaten, Vortrag gehalten, am 5. Congresse der Schweiz, Odontologischen Gesellschaft in Genf (am 4. October, 1890), von Dr. Theodor Frick, zahnarzt in Zurich. Zurich: Friedrich Schulthess, 1891.

Souvenir of the Banquet in Honor of the Dental Patriarchs, New York, January 31, 1891.

OBITUARY.

DR. JOSEPH LEIDY.

DIED, in Philadelphia, April 30, 1891, of congestion of the brain, JOSEPH LEIDY, M.D., LL.D., in the sixty-eighth year of his age.

Dr. Leidy was born in Philadelphia, September 9, 1823. He studied medicine under Dr. Paul B. Goddard, and graduated at the University of Pennsylvania in 1844. He practiced his profession less than two years, except during the civil war, when he served as a surgeon in the Satterlee General Hospital in Philadelphia. Beginning as assistant in the chemical laboratory, he became in turn prosector, demonstrator of anatomy, and professor of anatomy in the university, which chair he held to the close of his life. He also held the chair of natural history in Swarthmore College, was director of the department of biology in the University of Pennsylvania, and one of the faculty of the Wagner Free Institute of Science.

Dr. Leidy was a member of almost every prominent scientific society in Europe and America, including the following: National Academy of Sciences of the United States; Philadelphia Academy of Natural Sciences, of which he has long been president; Biological Society, Paris; Imperial Society of Naturalists, Moscow; London Zoölogical Society; Leopold-Charles Academy of Sciences, Jena; Royal Academy of Sciences, Munich; Royal Bohemian Society of Sciences, Prague; Royal Zoölogical and Botanical Society, Vienna; Economy and Agricultural Academy, Florence; Geological Society, London; Natural Historical Society, Dublin; Linnæan Society, London; Anthropological Society, London; Liverpool Literary and Philosophical Society, and Copenhagen Society of Science. He received many honors, including that of LL.D. from Harvard, the Lyell medal from the Geological Society of London, the Walker prize from the Boston Society of Natural History, and the Cuvier medal from the French Academy of Sciences.

The titles of Professor Leidy's published papers, on biological, zoölogical, and paleontological subjects, exceed eight hundred in number; they were issued principally by the Philadelphia Academy of Natural Sciences, the Smithsonian Institution, and under the auspices of the national government. His reputation as a scientist was world-wide. He was an accomplished draughtsman, a recognized authority in geology, mineralogy, botany, entomology, zoölogy, and conchology, and as an osteologist and comparative anatomist leaves probably not a living peer—no man who possesses an equally comprehensive knowledge.

Professor Leidy was known, respected, honored, and loved all over the world. Appreciation of his rare intellectual gifts was forgotten in admiration of his sincere, sweet-tempered, loving nature. He was singularly modest, retiring, and unassuming; genial and kindly in spirit and manner,—the friend of all, the enemy of none; a walking encyclopedia of information, as approachable as a child, ready at all times and with evident pleasure to give the benefit of his knowledge to all who sought it. His death will be mourned wherever science is valued throughout the earth, but Philadelphians especially will miss his kindly face, his ready hand, his cordial greeting, and his noble example of industry, integrity, and manly character.

DR. EDWARD MAYNARD.

DIED, at Washington, D. C., May 4, 1891, of Bright's disease, EDWARD MAYNARD, A.M., M.D., D.D.S., in the seventy-ninth year of his age.

Dr. Maynard was born at Madison, N. Y., April 26, 1813. He was educated at Hamilton Academy, and entered the Military Academy at West Point in 1831. On account of delicate health he resigned, and gave his attention to civil engineering and the study of architecture. He settled in Washington in 1836, and with occasional absences practiced dentistry there up to March, 1890.

Dr. Maynard made a number of inventions in instruments, contributed valuable papers to dental literature, and introduced and described methods of practice some of which have been generally adopted. He called the attention of the Baltimore College of Dental Surgery in 1846 to the diversity in situation, form, and capacity of the maxillary antra, and asserted the existence of dentinal fibrils before their discovery by the aid of the microscope.

In 1845 Dr. Maynard was employed as court dentist to the imperial family of Russia, and was offered a permanent position with title and rank of major, and to be attached to the imperial court, on condition of his remaining ten years in Russia, which offer was declined.

In 1857 Dr. Maynard accepted the chair of theory and practice in the Baltimore College of Dental Surgery, and subsequently filled a like chair in the faculty of the National University at Washington. His clientele included presidents, cabinet officers, senators, representatives, officers of the army and navy, foreign ministers, etc.

Dr. Maynard invented and patented, from 1845 to 1886, many devices relating to rifles and muskets, including a breech-loading rifle everywhere known as the Maynard rifle. He was twice married, —first in 1838, to Miss Ellen S. Doty, of Sherburne, N. Y., of which union six children survive, one of whom is Dr. John D. Maynard, of New York. In 1869 he married Miss Nellie Long, of Savannah, Ga. A daughter by this marriage and the widow survive.

DR. S. TOMLINSON.

DIED, at Plainville, Conn., February 11, 1891, of apoplexy, Dr. S. TOMLINSON, in the seventy-first year of his age.

Dr. Tomlinson was born at Derby, Conn., and studied dentistry with Dr. W. B. Hurd, then of Connecticut but now of Brooklyn, N. Y. Dr. Tomlinson settled in practice in Brooklyn in 1850, but many years since, on account of failing health, removed to Plainville, Conn., where he has been occupied to some extent with his chosen profession, and also largely as a writer for various journals.

Dr. Tomlinson was possessed of a fine artistic sense, which made him skillful in the working of the precious metals, which constituted the only base for dental plates a half-century ago. He also had a fine reputation for his artificial teeth.

One who knew him well writes that Dr. Tomlinson's life was a model of "temperance, benevolence, chastity, and loving-kindness." He leaves a wife and two children.

DR. E. R. E. CARPENTER.

DIED, in Chicago, March 20, 1891, of pneumonia, Dr. E. R. E. CARPENTER, in the fifty-ninth year of his age.

Dr. Carpenter was born in Providence, R. I., May 4, 1832. Orphaned by the death of his father at three years of age, he was adopted by his elder brother, Dr. William V., a surgeon in Toronto, Canada, where he developed a taste for dentistry, and began its practice at an early age. In 1860 he opened an office in Chicago, where he remained until 1866, when on account of failing health he removed to Montana. He had a large and lucrative practice in Chicago, and was highly esteemed as an operator. He had the confidence and regard of a large circle of friends. He leaves a widow, *née* Miss Emma Rathbone, of Grand Rapids, Mich., two daughters, and a son, Elliott R., a graduate in dentistry at the University of Pennsylvania, class 1890–91.

DR. RALPH A. PARSONS.

DIED, at West Roxbury, Mass., April 3, 1891, of diphtheria, RALPH A. PARSONS, M.D., in the thirtieth year of his age.

Dr. Parsons was born in Stratton, Vt., September 3, 1861. He studied medicine at the Vermont University at Burlington, and subsequently at the University of New York, where he graduated in 1888, during which year he settled at West Roxbury, Mass., where he acquired an extensive practice.

Dr. Parsons was a lecturer on materia medica in the Boston Dental

College, and at a recent special meeting of the faculty of that institution resolutions of respect to his memory were passed, reciting that the college had "sustained the loss of an earnest and enthusiastic worker, whose able and scientific instructions were shown in the remarkable progress of the students under his charge."

DR. STEPHEN R. WING.

DIED, in Philadelphia, Pa., May 16, 1891, of a complication of diseases, STEPHEN R. WING, D.D.S., in the thirty-ninth year of his age.

Dr. Wing was born in Sandwich, Mass., November 25, 1852. He studied dentistry at the University of Pennsylvania, graduating with high honors in 1881. He practiced for a few months in this city, and then removed to Pernambuco, Brazil, where he continued to practice his profession until within a short time, arriving in this city, whither he had come for treatment, only two weeks preceding his death.

On February 3, 1885, Dr. Wing married Miss Lydia Remington, of Philadelphia, who, with one son, survives him.

DR. JUAN J. ROSS.

DR. JUAN JOSÉ ROSS, for many years a practicing dentist of Guatemala, Central America, died at his late residence in that city, on October 1, 1890. He was formerly of Memphis, Tenn.

RESOLUTIONS ON THE DEATH OF DR. W. H. ATKINSON.

AT a meeting of the Central Dental Association of Northern New Jersey, held April 20, 1891, resolutions were adopted expressive of the regret of the association in the death of Dr. Atkinson, and of the appreciation of his abilities, zeal, industry, and self-sacrificing devotion to the interests of the dental profession.

At a meeting of the Chicago Dental Society, held May 5, 1891, resolutions were adopted expressive of a sense of personal bereavement in the death of Dr. Atkinson, and in testimony of his conspicuously useful life and example.

At a meeting of the Pennsylvania Association of Dental Surgeons, held in Philadelphia, May 14, 1891, a preamble and resolutions were unanimously adopted expressive of affectionate esteem and respect, and of high appreciation of the services rendered to dentistry by Dr. W. H. Atkinson, and deploring his death as the loss of a teacher, friend, and brother.

DENTAL LEGISLATION.

TENNESSEE'S DENTAL LAW.

FOLLOWING is the text of "An act to regulate the Practice of Dentistry in the State of Tennessee, and to punish violaters thereof," enacted March 23, 1891, and duly signed by the governor of the State.

SECTION 1. *Be it enacted by the General Assembly of the State of Tennessee*, That it shall be unlawful for any person to practice, or attempt to practice, dentistry or dental surgery in the State of Tennessee without first having received a diploma from some reputable dental college, school, or university department, duly authorized by the laws of this State, or some other of the United States, and in which college, or school, or university department there are at the time of issuance of such diploma annually delivered a full course of lectures and instructions in dentistry and dental surgery; *Provided*, That nothing in Section 1 of this act shall apply to any person engaged in the practice of dentistry or dental surgery in the State at the time of the passage of this act, except as hereinafter provided. *And provided further*, That nothing in this act shall be so construed as to prevent physicians, surgeons, or others from extracting teeth.

SEC. 2. A board of examiners, consisting of six practicing dentists of acknowledged ability as such, two of whom shall be residents in each of the three subdivisions of the State, East, Middle, and West Tennessee, is hereby created, who shall have authority to issue certificates to persons in the practice of dentistry or dental surgery in the State at the time of the passage of this act; and also to decide upon the validity of such diplomas as may be subsequently presented for registration, as hereinafter provided, and issue certificates to all applicants who may hereafter apply to said board and pass a satisfactory examination.

SEC. 3. The members of said board shall be appointed by the governor, and shall serve for a term of three years, excepting that the members of the board first appointed shall be made as follows: Two for one year, two for two years, and two for three years, respectively, and until their successors are duly appointed. In case of vacancy occurring in said board by resignation, removal from State, or death, such vacancy may be filled for its unexpired term by the governor as provided by this act.

SEC. 4. Said board shall keep a record, in which shall be registered the names and residence, or places of business, of all persons authorized under this act to practice dentistry or dental surgery in this State. It shall elect one of its members president and one secretary thereof. And it shall meet at least once in each year, at the time and place fixed for the meeting of the State Dental Association, and as much oftener and at such times and places as it may deem necessary. A majority of the members of said board shall constitute a quorum, and the proceedings thereof shall be open to public inspection.

SEC. 5. Every person engaged in the practice of dentistry or dental surgery within this State at the time of the passage of this act shall, within six months thereafter, cause his or her name, residence, and place of business to be registered with said board of examiners, upon which said board shall issue to such person a certificate duly signed by a majority of the members of said board, and which certificate shall entitle the person to whom it is issued to all the rights and privileges set forth in Section 1 of this act.

SEC. 6. Any person desiring to commence the practice of dentistry or dental surgery within this State after the passage of this act shall, before commencing such practice, file for record in a book kept for such purpose, with said board of examiners, his or her diploma, or duly authenticated copy thereof, the validity of which said board shall have the power to determine. If accepted, said board shall issue to the person holding such diploma a certificate duly signed by all, or a majority, of the members of said board, and which certificate shall entitle the person to whom it is issued to all the rights and privileges set forth in Section 1 of this act: *Provided*, That any person, whether holding a diploma aforesaid or not, shall have the privilege of making application to said board, and, upon undergoing a satisfactory examination, shall be entitled to a certificate in like manner as a person holding a diploma, and upon the same terms.

SEC. 7. To provide for the proper and effective enforcement of this act, said board of examiners shall be entitled to the following fees, to wit: For each certificate to persons engaged in the practice in the State at the time of the passage of this act, the sum of one dollar; for each certificate issued to persons not engaged in the practice of dentistry in the State at the time of the passage of this act, the sum of five dollars.

SEC. 8. The members of said examining board shall receive the compensation of five dollars per day for each day actually engaged in the duties of his office, which, together with all other legitimate expenses incurred in the performance of such duties, shall be paid from the fees and penalties received by the board under the provisions of this act, and no part of the expenses of said board shall at any time be paid out of the State treasury. All moneys in excess of said "*per diem*" allowance and other expenses shall be held by the secretary of said board as a special fund for meeting the expenses of said board, he giving such bond as the board may from time to time direct, and said board shall make an annual report of its proceedings to the governor by the 15th day of December of each year, together with an account of all moneys received and disbursed by them in the pursuance of this act.

SEC. 9. Any person who shall violate this act by practicing or attempting to practice dentistry or dental surgery within the State, without first complying with the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not less than twenty-five nor more than three hundred dollars.

SEC. 10. This act shall take effect from and after its passage, the public welfare demanding it.

NEW HAMPSHIRE'S DENTAL LAW.

FOLLOWING is the text of a bill entitled "An act to establish a Board of Registration in Dentistry" for the State of New Hampshire, which was passed at the late session of the legislature, and has been signed by the governor of the State.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. The governor, with the advice and consent of the council, shall appoint three skilled dentists, of good repute, residing and doing business in the State, who shall constitute a board of registration in dentistry; but no person shall be eligible to serve on said board unless he shall have been regularly graduated from some reputable medical or dental college duly authorized to grant degrees in dentistry, or shall have been engaged in the practice of dentistry for a period of not less than ten years previous to his appointment. The term for which the members of said board shall hold their office shall be three years, except that one of the members of the board first to be appointed shall hold his office for the term of one year, one for the term of two years, and one for the term of three years respectively, and until their successors shall be duly appointed and qualified. Any vacancy occurring in said board shall be filled by the governor in conformity with this section; and any member of the board may be removed from office for cause by the governor, with the advice and consent of the council.

Sec. 2. The board shall choose from its number a president and secretary, and it shall meet at least once in each year. Two of said board shall constitute a quorum.

Sec. 3. Within six months from the time this act takes effect, it shall be the duty of every person who is at that time engaged in the practice of dentistry in this State, or who has received a dental degree from some college, university, or medical school authorized to confer the same, or shall have obtained a license from the New Hampshire Dental Society, to cause his name, residence, and place of business to be registered with said board, who shall keep a book for that purpose. The statements of every such person shall be verified under oath in such manner as may be prescribed by the board. Every person who shall so register with said board, as a practitioner of dentistry, shall receive a certificate to that effect, and may continue to practice without incurring any of the liabilities or penalties provided in this act.

Sec. 4. All persons not provided for in section three may appear before said board at any of its regular meetings, and be examined with reference to their knowledge and skill in dentistry and dental surgery; and the board shall issue to such persons as it finds to possess the requisite qualifications a certificate to that effect.

Sec. 5. The said board shall charge each person receiving a certificate the sum of fifty cents, and each person appearing before them for examination for a certificate of qualification a fee of five dollars in case such certificate shall be granted. Any person failing to pass a satisfactory examination shall be entitled to be re-examined at any future meeting of the board. The board shall make an annual report of its proceedings to the governor by the thirty-first day of December in each year. All fees received by the board shall be paid annually by the secretary of the board into the treasury of the State.

Sec. 6. The compensation and all necessary expenses of the board shall be paid from the treasury of the State. The compensation of the board shall be five dollars each for every day actually spent in the discharge of their duties, and their necessary expenses in attending the meetings of the board. Such compensation and expenses shall be approved by the board and sent to the State treasurer, who shall certify to the governor and council the amounts due; *Provided*, That the amount so paid shall not exceed the amount received by the treasurer from the board in fees as herein specified, and so much of said receipts as may be necessary is hereby appropriated for the compensation and expenses aforesaid.

Sec. 7. Any person who shall falsely claim or pretend to have or hold a certificate of license granted by any board organized under this act, or who shall falsely, and with intent to deceive the public, claim or pretend to be a graduate from any incorporated dental college, or who shall practice dentistry without obtaining a certificate as provided in this act, or who shall violate any of the provisions of this act, shall be deemed guilty of a misdemeanor, and upon conviction shall be fined not less than fifty nor more than one hundred dollars for each and every offence.

SEC. 8. Nothing in this act shall apply to any practicing physician who is a graduate from the medical department of any incorporated college.

SEC. 9. This act shall take effect upon its passage, and all acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

HINTS AND QUERIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In a note published in the March number of the DENTAL COSMOS I expressed an opinion that the so-called local anesthetic medicines injected into living animal tissues are not, and cannot be, locally diffused sufficiently for certain and satisfactory local anesthetic effects. As this is a fundamental question of very great importance, and still remains open, I write now to suggest that it might possibly be settled, or at least some valuable fact be discovered, by injecting medicines hypodermically, and searching for them, chemically and otherwise, in the tissues adjacent to the point of injection. The injections could be given a strongly distinctive color, and the search should be for both medicine and color beyond the limits of the cavity made by the injection. In such a course of investigation a variety of drugs should be tried for both immediate and after-effects. For instance, it would be worth while to note the consequences of arsenical injections on periosteum. If arsenic is a good local anesthetic, let us be assured of its safety. Such experiments could, perhaps, be made on animals in use for other physiological or pathological investigation.

Anyhow, conscientious practice demands more exact knowledge along this line. Clinical testimony being divided, scientific confirmation is wanted. It would help us to know that local anesthetics *do* anesthetize to know that they *can*.

But the importance of the question is not limited by the demand for local anesthesia, great as that assuredly is. If cocaine can be locally diffused to the degree of completely suspending sensation in a part, then probably other medicines can be, in the same manner, directly applied for other specific purposes, and that means scarcely less than a revolution in medical and surgical practice. If an anatomical part can be soaked at will, then for most local disorders, at least, the hypodermic point stands ready to deliver the best drugs where they will do the most good, and to our steadily growing list of local anesthetics we should make haste to add local stimulants, local sedatives, local alteratives, local absorbents, local antidotes,—say for snake and mad-dog bites,—and so on to the end of all therapeutic possibility.

Let us know the truth. We are living in the last decade of the nineteenth century!—J. W. HOLT, Goldsboro, N. C.

A NEW FORM OF ABSCESS LANCET.—These lancets were designed with special reference to the evacuation of deep-seated abscesses, also abscesses deep-seated or otherwise covered with thick leathery tissue, in which the lips of simple incisions close mechanically as the lancet is withdrawn, preventing the evacuation of pus. Such conditions are frequently found in the tissue covering the hard palate, the abscess usually traceable to lateral incisors. With one of these lancets the operator may know when he has penetrated the sac by the flow of pus through the channel in the blade, thus avoiding the necessity of a secondary incision, and the pain resulting from pressure made necessary in the effort to evacuate the contents of the sac after an incision by the ordinary lancet blade. Four forms are illustrated, as those which are most generally useful. The preference will probably be given, for ordinary cases, to Nos. 1 and 3. —J. Edward Line, Rochester, N. Y.

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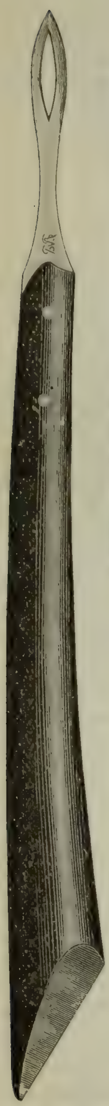

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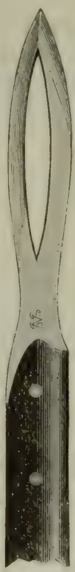

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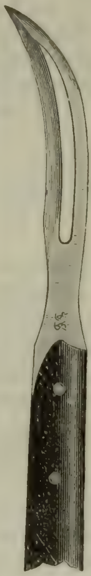

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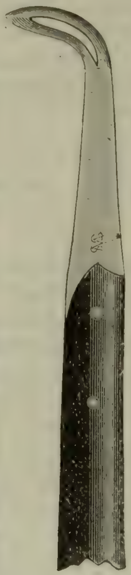
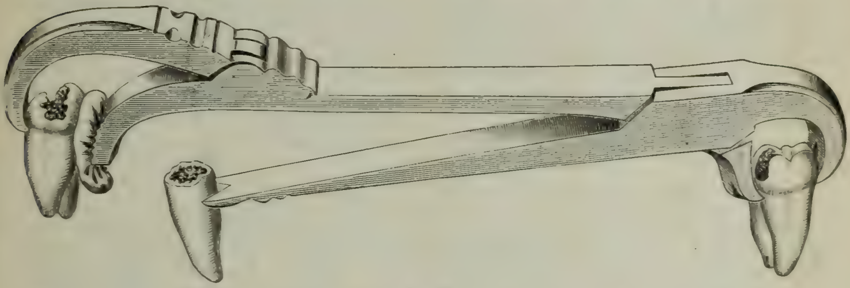


Spittoon Attachment.—The fountain spittoon is an indispensable article in the operating-room of crown- and bridge-workers. I have made an addition to the attachments in the shape of a rubber tube, three feet long, connecting with the faucet which is used to draw water for the glass. In the other end of this tube I placed a three-inch section of a mouth blow-pipe; the pipe having a bulb near the end is preferable. This forms a perfect dropper and carrier for water to keep the corundum wheels wet while grinding down a tooth for a cap-crown, or removing the surplus of a gold filling. A great many have trouble in grinding down sensitive teeth for caps. I have no trouble on that score, for the simple reason that by directing the cold water directly upon the sensitive parts the patient in feeling the pain from the water does not get time to think of that from the grinding, and the friction from the wheel soon warms the tooth enough to take away the pain from the cold water, and by the time the grinding begins to hurt I am through. I have yet to find the first patient for whom I could not grind down the teeth as far as was necessary. This method will pass muster with the plan of driving out live nerves with a piece of orange-wood and a hammer, and I can safely say that once practiced they will both be found to fill the bill. An attachment for the spittoons for this purpose, with a stop-cock, could be arranged to regulate the flow of water.—Emory A. Bryant, D.D.S., Aspen, Col.

Ready-Made Contour Crowns of Amalgam.—Dr. Joseph Arkovy, of Budapest, Hungary, provides bicuspid and molar crowns in a variety of sizes of well-shaped, completely contoured forms made of amalgam ready for immediate adaptation to large carious cavities or to replace entirely lost tooth-crowns. After properly preparing the cavity or root, an impression is taken and the contoured crown cut with saw and file to fit the cavity or root margins, due attention being given to the articulation, and allowance made for the filling between joints. Then some amalgam is mixed for filling the anchorages in the cavity or root, and a little mercury rubbed on the joining surfaces of the crown, which is pressed into place, trimmed at the joint with a very thin instrument, and secured by ligature, wedge, or any convenient means until the uniting amalgam has fully set. Subsequent polishing completes the operation.—W.

AN ANCIENT EXTRACTING INSTRUMENT.—The illustration herewith presented is of an extracting instrument belonging to the surgical case of the surgeon of the "Mayflower," the said surgeon having been one of the ancestors of the Maupin family, of Virginia, in which it has been handed down from generation to generation. The forceps were exhibited at the meeting of the Virginia State Dental Society, at Roanoke, last year, by Dr. J. L. Doggett.



There seems to be no doubt, either from the appearance or from the history of the instrument, of its genuineness.

COAL FILLINGS.—On page 243 of the DENTAL COSMOS for March there is an article on "Filling Teeth with Charcoal," by Dr. Forberg. He has simply rediscovered something that both German and French dentists used over twenty years ago, as I have reason to know from patients of mine who had been to dentists in those countries, and had pulp-canals filled with carbon. I have used it frequently myself since that time, but would recommend it only as a temporary filling, or what might be called a dressing, as it is too porous for a permanent filling, and experience has taught me that it will get foul after a time, and failure will be the result. But in treating abscesses that are obstinate in healing, animal charcoal finely pulverized and worked well into the cotton placed in the canal for treatment will often succeed, and I have not been without it in my operating-case for many years. It is only another resource when the common ones fail.—W. H. JACKSON, D.D.S., Ann Arbor, Mich.

BLUNT-NOSED SHEARS.—In making gold crowns and fitting them for setting, I find that blunt-nosed shears are much to be preferred to the curved shears sold at the depots for that purpose. The ordinary straight shears ground off square at the points will enable one to cut the crown around very accurately and with much less risk than with the curved shears.—WM. LOEWENTHALL, Hoboken, N. J.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

This bibliography will be continued monthly in the Dental Cosmos, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

Jeanty (J.-Marcel.) De l'empyème latent de l'antre d'Highmore. Étude accompagnée de vingt-deux observations inédites recueillies à la clinique du Dr. Lichtwitz (de Bordeaux). Bordeaux, 1891, Feret et fils. 137 p. 8°.

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J. W. White

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IN MEMORIAM.

DR. JAMES W. WHITE.

DIED, at Philadelphia, Pa., May 27, 1891, of heart-failure, JAMES WILLIAM WHITE, M.D., D.D.S., A.M., in the sixty-fifth year of his age.

A brief notice, inserted in the June number of the DENTAL COSMOS just after its issue from the press, announced the death of its editor, Dr. James W. White.

Death came suddenly, unexpectedly. The previous day Dr. White was at the office as usual. He referred several times to an uncomfortable sensation in the region of the heart, but pursued his duties with his accustomed cheerfulness and diligence, and was the last to leave the building. According to his wont he spent the evening with his family in social converse, and retired without premonition that within a few short hours his eyes would close forever. He awoke unusually early, and spoke to his wife of feeling "dyspeptic," but shortly afterward announced that he was better, and would dress for the day. While so engaged he fell forward, dying almost instantly.

Last winter he had a severe attack of a somewhat obscure character, with symptoms resembling those of rheumatic pharyngitis. This had annoyed him at intervals for many years, but the last attack was the most protracted, and he recovered from it slowly, though its effects were gradually wearing away, and his friends and business associates were hopefully looking forward to a long continuance of his useful and honorable career. But it was not to be so. His work is done; he has entered into the eternal rest. Those who mourn him have the sad comfort of knowing that, however the suddenness of his taking away may have shocked them, he died as he wished to die, in the full vigor of his ripened powers. No man had a deeper horror of living to decrepit old age, to become a care to those his life was spent in caring for. He leaves a widow, and three sons, Professor J. William White, of the University of Pennsylvania; Samuel Stockton White, and Louis Piers White.

The funeral services were conducted at the residence, 2012 Green street, on Friday, the 29th of May, by Rev. Dr. Edwin C. Sweetser, of the Universalist Church of the Messiah, assisted by Rev. Dr. William H. Furness. The interment was private, at Woodlands Cemetery. The pall-bearers were Mr. George W. Childs, Dr. D. Hayes Agnew, Mr. Horace Howard Furness, Mr. Joseph C. Fraley, Dr. H. C. Wood, Dr. Lewis D. Harlow, Dr. George W. Ellis, Mr. Samuel T. Jones, Mr. S. R. Bingham, Dr. W. Storer How, Mr. John H. Long, and Mr. Edward H. Hance.

James W. White, the youngest child of William Rose and Mary (Stockton) White, was born September 29, 1826, at Hulmeville, Bucks County, Pennsylvania. On his father's side he was descended from Henry White, who settled in James City County, Virginia, some time previous to or about 1649; and through his mother, from Richard Stockton, who came to Flushing, Long Island, from England about 1656, and one of whose descendants was Richard Stockton, the signer of the Declaration of Independence. When he was four years old his father died, and his mother removed with her children to her native place, Burlington, New Jersey. In his fifteenth year (13th May, 1841) he entered the establishment of his uncle, the late Samuel W. Stockton, of Philadelphia, whither his elder brother Samuel had preceded him, to learn the "art and mystery of the manufacture of incorruptible teeth." In 1844 the elder brother began business in the same branch of manufacture, on his own account, and James engaged with him.

In a speech reminiscent of the early days of dentistry Dr. White, referring to this period, some time since described himself as "the entire working force of the establishment," which was a garret at the corner of Seventh and Race streets, where he "ground the crude materials in a hand mortar, compounded them, and carried through all the processes to the finished products,—such as they were,—then turned traveling salesman, and exchanged them for currency."

The connection thus begun continued, with one or two brief interruptions, until his death. He saw the seed planted, watched it germinate, and helped to nurture its healthy growth to magnificent proportions. With every step of the development of the great business which grew from the humblest beginning until it overtopped all others of its kind in the world he was closely identified.

In 1879 Dr. Samuel S. White died, and in 1881 The S. S. White Dental Manufacturing Company was organized with a paid-in capital of one million dollars. The recognized executive and administrative ability of Dr. James W. White, and his intimate knowledge of the business, made him the logical head of the new company, and he was unanimously elected its president. That he well fulfilled every expectation is shown by the unflagging prosperity of the house, which has steadily gone forward under his administration, and by the fact that he was honored by an undisputed re-election to the presidency of the company with each succeeding year. The business grew constantly, involving the necessity of increased facilities, enlarged factories, and a greater number of employés, each bringing additional care and labor to the president, who bore the burden easily, cheerfully, and efficiently.

Besides his connection with the house with which his life-work was identified, Dr. White was at the time of his death the senior member of the well-known firm of manufacturing chemists, Hance Brothers & White, although not actively engaged in the conduct of the business, and a member of the board of directors of the German-American Title and Trust Company.

He studied medicine at the University of Pennsylvania, and received the degree of M.D. from that institution. He never, however, followed medicine as a vocation, though he practiced somewhat extensively among his relatives and acquaintances, as well as among the poor, and was frequently called in consultation by eminent practitioners because of his exceptional ability as a physician. The honorary degree of D.D.S. was conferred upon him by the Pennsylvania College of Dental Surgery, and the degree of A.M. by St. Lawrence University, of Canton, New York.

Entering early into the practical affairs of life, his opportunities for acquiring the education of the schools were limited, but with the aid of an intellect of the highest order and a phenomenal memory he became one of the best-informed men of his day. He had read extensively upon almost every topic of human interest, and a fact once within his grasp never escaped, never seemed to be lost sight of even for a moment. As a consequence, his mind was a veritable storehouse of knowledge, the ease with which he drew upon it suggesting at times the thought that whatever he learned was mentally labeled, indexed, and filed away in an orderly manner where it would be found when wanted. Method was a part of his nature. Whatever he did was done promptly, neatly, and methodically, and therein lay the secret of his remarkable executive ability.

Although not posing as an orator, he was, on occasion, an excellent public speaker, one who charmed by his concise, expressive diction, apt illustration, and convincing logic.

His bent was distinctly literary. He was a ready, forcible, and polished writer, having a rare faculty of condensation,—of saying much in few words, of making every phrase pregnant with meaning,—and an illustrative and descriptive talent rarely equaled; qualities which, conjoined with an exhaustive knowledge of any subject upon which he wrote, gave to the productions of his pen a clearness and completeness that always commanded attention. His contributions to dental and medical literature were numerous and important. Upon such subjects as the diseases connected with dentition, and the general physiological and pathological relations of the teeth to the whole economy or to abnormal conditions of remote organs, he was recognized as the highest authority in the world. He was frequently solicited to prepare papers upon these topics, and always responded willingly.

Dentistry is indebted to him for several volumes of great practical value. Among them may be named "Dental Materia Medica," "Taking Impressions of the Mouth," and "The Mouth and the Teeth." He was the author of the exhaustive presentation of "Diseases Incident to the First Dentition," in the American System of Dentistry; and also of a little pamphlet, "The Teeth, Natural and Artificial," which has had a circulation of hundreds of thousands, spreading everywhere among the people an accurate knowledge of the material facts about the teeth and the necessity and means of proper care for their preservation.

But it was as editor of the DENTAL COSMOS that his highest literary ability was exhibited and the deepest impress of his virile mind upon dental literature was made. Here was a field for which he was so peculiarly fitted that his work in it was marked by that quality for which the English language contains but one word,—genius. No other fitly characterizes the faculties which so exalted the aims, broadened the scope, and enlarged the achievements of the DENTAL COSMOS that its editorship should be accounted the "proudest position, the highest honor, which dentistry has to offer any man." These words were spoken since Dr. White's death by a practitioner of dentistry favorably known to the profession everywhere.

It was perhaps Dr. White's proudest boast that no number of the DENTAL COSMOS, from its establishment in 1859, had been issued without his personal supervision. His name did not appear as its responsible editor until 1872, but his broad knowledge, his exquisite literary taste, his keen insight, his rare judgment, were in its service from the first, ever guiding it onward and upward to the ideal of perfect journalism. To his mind, the journalistic literature of a scientific profession did not fulfill the object of its being if it was merely a record of passing events or a vehicle for the exchange of the common information of the day,—the iteration and reiteration of truths known to all men. It should be the prophet of the higher aspirations of the profession it represented, the torch-bearer of a wider knowledge, the teacher of a nobler science, the inspiration of a better practice. It could not stand still; the ideal of yesterday should be the actual of to-day, with a yet higher goal set for to-morrow's effort. Each issue should be a symposium of the freshest thought of the brightest minds, to the end that those who read should have a constant stimulus to excel and thus in time to offer their best fruits upon a common altar. This was the ideal which he endeavored to realize in his conduct of the DENTAL COSMOS. How well he succeeded is shown by the above-quoted remark, which expresses in no exaggerated form the sentiments of the vast majority of the profession.

The last contribution which Dr. White made to the DENTAL COSMOS was a characterization of his old friend, Professor Joseph Leidy, who had died less than a month before him. Its closing sentences so fittingly and accurately describe Dr. White himself that they are reproduced here:

> "Appreciation of his rare intellectual gifts was forgotten in admiration of his sincere, sweet-tempered, loving nature. He was singularly modest, retiring, and unassuming; genial and kindly in spirit and manner,—the friend

of all, the enemy of none; a walking encyclopedia of information, as approachable as a child, ready at all times and with evident pleasure to give the benefit of his knowledge to all who sought it. His death will be mourned wherever science is valued throughout the earth, but Philadelphians especially will miss his kindly face, his ready hand, his cordial greeting, and his noble example of industry, integrity, and manly character."

The key-note of his thought, whether in religion, literature, political or social science, or on professional subjects, was liberality, a catholic tolerance for views honestly held, however at variance with his own. Denominationally he was a Universalist, for many years moderator of the Church of the Messiah. Himself a man of strong convictions, and courageous in upholding them, with the broadest charity for the opinions of others, he insisted that every one should not merely have the right but owed the duty of thinking and speaking for himself. As secretary of the "People's Literary Institute," and chairman of its lecture committee, he managed it successfully for seven years,—before and during the war,—and worked energetically in the maintenance of freedom of speech against much and bitter opposition, including at one time vigorous proceedings by the mayor of the city.

He was identified with the Freedman's Aid Society; an active worker in the Sanitary Fair, and, as chairman of the Committee on Orations and Lectures of that great enterprise, secured the substantial sum of ten thousand dollars toward the grand total. He was a member of the commission appointed by the University of Pennsylvania under the will of the late Henry Seybert, to investigate the phenomena of spiritualism. He was treasurer of the McQuillen fund, of the Webb fund, and of the Dental and Oral Surgery Section of the IXth International Medical Congress.

Although always taking a keen interest in political affairs, he never held public office but once, and his official career was a wholesome example. When the present city charter went into operation in 1887, Dr. White's well-known reputation as a practical philanthropist gained him, without solicitation on his part, the appointment of President of the Board of Charities and Correction, a department of the city government having charge of the public hospitals and correctional institutions. The position was one of honor and hard work, without pay. He reorganized the department thoroughly, placing the administration of the various institutions upon a civil service basis, and, after serving with conspicuous fidelity for two years, was removed for refusing to acquiesce in a violation of both the letter and the principles of the civil service laws of the city, for the maintenance of which he was appointed. The entire intelligent and reputable press of Philadelphia sustained him in his position in this matter, regardless of party affiliations, and with a unanimity as to both his personal character and the great value of his public services which was a tribute as gratifying as it was unique.

Another example of his practical philanthropic work is the Maternity Hospital, of which he was one of the organizers and the president from its foundation in 1872 to his death. Its firm establishment and successful operation were largely due to his untiring zeal. He was also treasurer of the Siberian Exile Relief Association.

These were a few of his public benefactions. Privately he dispensed of his means in the relief of distress with a liberal hand, and labored unweariedly to better the condition of the afflicted and unfortunate.

Without a trace of sentimentality, he loved his kind, and did what he could to make the world brighter and better for his presence in it. His relations with employés were of the most friendly and cordial nature. The universal feeling toward him among those employed in the great establishment of which he was the executive head is thus expressed by one of them: "During thirty-eight years' continuous association not a word or act or look from him has cast a shadow of unpleasantness, and I doubt not the others have similar remembrance."

After all, it is what a man does that reveals his inner nature. From whatever point the view is taken, Dr. White, judged by his deeds, was a man of supreme ability, of high purpose, of noble aspiration, of untiring assiduity,—in a word, a strong, manly man. He had the moral courage to uphold what he thought was right, the physical courage to strike a sturdy blow for that right. Of the highest moral rectitude and strictest probity, he could pity the weakness or folly of those who stumbled and fell because unable to resist temptation, and help them to their feet again. He had an innate tact, a capacity to harmonize difficulties and organize success, that gave him marked administrative ability. Whatever he undertook to do was pursued intelligently, industriously, and diligently to the end.

But he was, above all other things, a lovable man,—a friend to depend on in sickness or in health. He had that indescribable quality sometimes called personal magnetism, which attracted people to him ; a genial humor which charmed them, and a sterling worth that bound them firmly to his side. As an entertaining conversationalist he had few equals. Besides his wide grasp of real knowledge, he possessed a fund of anecdote that was inexhaustible. Every incident reminded him of a story, in the telling of which he was inimitable. Always cheerful, always frank, always helpful, he will be missed by a wide circle of friends who will not soon forget his kindly ways. The *Public Ledger*, in an appreciative editorial reference to his death, said, "'Benedicite fratercule' were the words which welcomed him into a little organization to which he belonged. 'Benedicite fratercule' will be echoed by many hearts which are sorrowful at parting with him."

"A blessing upon you, little brother," even as you diffused blessings when you were here !

F. L. HISE.

The directors and officers of The S. S. White Dental Manufacturing Company, at a special meeting held June 3, 1891, unanimously adopted the following minute regarding the death of Dr. White :

The board of directors and the officers of The S. S. White Dental Manufacturing Company desire to express their sorrow for the loss that has befallen them in the very sudden and unexpected death of their associate and friend, Dr. James W. White, who has been president of this company from its organization.

He was a man of a high order of ability and wide scientific attainment ; of great energy and tireless industry ; of genial temperament and generous disposition ; of dauntless courage, and pronounced in convictions which he was ready and able to maintain upon proper occasion in any presence ; of perfect integrity and faithful to every trust.

Identified as he was with this business from its very beginning, forty-seven years ago, his long experience as a manufacturer and his great administrative and executive talent rendered him invaluable to the company.

As editor of the DENTAL COSMOS his name is a household word among dentists all over the world, and his unequaled skill and judgment in that direction have placed the journal very far in the front of dental periodical literature.

His contributions to dental and medical research have been widely quoted and generally accepted as of great value.

We mourn his loss. We shall miss his energetic work, his great experience, his mature judgment, his genial disposition, and his kindly ministrations, always at our disposal in time of need.

We direct that this minute be placed upon record, and a copy of it sent to his bereaved widow and children, accompanied by the expression of our deep sympathy with them in this great affliction.

J. M. LONGACRE,
S. S. WHITE, JR.,
W. H. GILBERT,
A. K. JOHNSTON,
J. CLARENCE WHITE,
H. M. LEWIS,
S. T. JONES.

At a special meeting of the stockholders of The S. S. White Dental Manufacturing Company, June 15, 1891, called to consider the death of the late president, Dr. James W. White, the following was unanimously adopted :

The stockholders of The S. S. White Dental Manufacturing Company, assembled in special meeting at the call of the board of directors, desire to record the expression of their sorrow for their loss by the death of Dr. James W. White, the president of this company from its foundation to the time of his death.

Most of us have been in almost daily contact with him for many years. Highly gifted by nature with the qualities of a wise and efficient executive, his experience of nearly half a century in the business had given him an accurate knowledge of all its details, and he was thus able to guide it into safe and profitable channels.

A man of great literary ability, both as writer and editor, he placed the DENTAL COSMOS at the head of dental periodical literature, and held it there without even an approach to rivalry.

We valued him not alone for his services to this company, but also for his character as a man ; for his genial, kindly ways ; his wise counsel, whether in business or private affairs ; as a friend to whom we could go freely, certain of a patient hearing and faithful advice ; for the unfailing generosity and benevolence of which we were constant witnesses, involving not alone his purse, but his great skill as a physician, which he placed freely at the service of any who needed it.

By his death this company has lost an able, devoted, and most valuable officer ; the world has lost a good man, whose life was filled with kind acts and useful works ; and we have lost a true and faithful friend.

We direct that this minute be filed among the records of the company, and that a copy of it be sent to his bereaved widow and children.

LEVI TEAL, *Chairman.*

A. W. CAREY, *Secretary.*

ORIGINAL COMMUNICATIONS.

THE DISINFECTION OF DENTAL AND SURGICAL INSTRUMENTS.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

ASEPSIS and antisepsis form the rock upon which the edifice of modern surgery is founded, and in virtue of which it has registered triumphs in the treatment of diseased conditions of the human body formerly unattainable.

The wonderful progress which has been made by surgery in the last ten years is the legitimate fruit of the growing knowledge of the part performed by microscopic organisms in spreading disease, and of the methods of counteracting or preventing their action.

The necessity of aseptic and antiseptic procedure in all operations in dental or general surgery is to-day, we may say, universally recognized. It is true that there are still some whose appreciation of their duty toward those who commit themselves to their care is so stunted that they insist upon the right to spread infection by unclean instruments or fingers that are not absolutely free from germs. Fortunately, however, such men are rapidly becoming fewer, and will not be able to hold out long against the just condemnation of an advancing profession.

Antisepsis is but one of the means to the production of asepsis. It should be the aim of every surgeon to perform all operations aseptically, and he who comes nearest to attaining this ideal will be more successful than he who lays the chief stress upon the subsequent antiseptic treatment.

If we wish to protect ourselves against robbery, it is a hundred times better to keep the thief out by appropriate locks than to allow him to enter by the open door and then take the chance of a conflict, in which we may possibly be worsted. When, however, the surgeon who uses the most scrupulous care in cleansing the part to be operated upon, his hands, towels, instruments, etc., before every operation,—*i.e.*, operates aseptically, and accomplishes results proportionate to his care,—disclaims the use of antiseptics, he is deceiving himself, for the reason that the very means used to bring about the aseptic condition—soap and brush, pure water, etc.—are themselves antiseptics. He is simply accomplishing by those simple means that which he, in most cases at least, might better and more easily do if he would take advantage of the more powerful means of sterilization.

There is no department of surgery in which the demand for antiseptic procedure is more urgent than in dentistry, for the reason that all of our operations are performed upon septic or infected tissues, and we have no means of rendering the territory to be operated upon aseptic except by the use of antiseptics of the highest character. We cannot extract a tooth, cleanse the canal of a pulpless tooth, excavate a cavity of decay or lance the gums ; we cannot even touch any point in the oral cavity without our instrument becoming coated with a layer of infectious material. We are therefore bound to use antiseptics, not only for the purpose of disinfecting the already infected tissues, but for sterilizing our instruments to avoid the transmission of infectious matter from one patient to another.

It is the use of antiseptics for the latter purpose which I have made the subject of a series of experiments to be described.

The necessity of absolute cleanliness on the part of the dentist, of his hands as well as of his instruments, napkins, drinking-glasses, rubber-dam, in short, of everything with which he comes in contact with the patient's mouth, is universally recognized ; at least there can be no one who has the courage to express a contrary opinion. And yet it is not at all difficult to find persons in the practice of dentistry who neglect this matter to an extent that is revolting to the taste and dangerous to the health, and it is anything but creditable to the dental profession that the proposition has been repeatedly made, to have the state of the dentist's instruments inspected from time to time by a health officer. Only a short while ago a surgeon, who fully recognizes the necessity of proper care of the teeth, made the statement that he had been obliged to allow his own to go to ruin because the uncleanliness of the dentist in the place where he resided was so great that he could not run the risk of an infection by his instruments.

That many people shun the dentist for no other reason than the above there is no doubt. It is to be hoped, however, that the number of dentists who still lay themselves open to the charge of uncleanliness is small, and that they will take care to wash this opprobrium from their hands.

I need not refer in particular to the esthetic aspect of the question, or picture the feelings which a refined, sensitive lady, or indeed anyone of a cleanly habit, must experience on having rusty or unclean instruments and soiled fingers plunged into her mouth. This is a matter which is to a certain extent self-regulating, in that those who have an appreciation of cleanliness will very soon find their way to more congenial hands.

In regard to the possibility of transmission of disease by dental instruments, there have been so many cases reported in dental and medical journals that the matter should be familiar to every practitioner of dentistry. I may call attention, however, to the large number of cases (some forty) reported in my book ("Micro-Organisms of the Human Mouth," pages 248, 274, 338), in which infections of various nature, including septicemia, pyemia, meningitis, and syphilis, followed operations in the mouth ; also to the cases reported by Parker,* in which a whole family was infected with syphilis through the extraction of a tooth ; finally to two cases which recently occurred in Berlin, in one of which syphilis, in the other septicemia followed tooth-extraction.

Anyone who examines carefully into the question will have no great difficulty in finding scores of cases of this kind, notwithstanding the fact that the great majority of them are never published. Of course the cases where infections of a less serious nature occurred are much more numerous.

It is a very fortunate provision that the gums, in a healthy state, offer so powerful a resistance to the invasion of the germs *of most infectious diseases*. For this reason a wound in the gums may be followed by scarcely any reaction whatever, while a similar wound on the hand with the same instrument may produce most disastrous results. It has been attempted to account for this fact on the *supposition that the saliva has an antiseptic action*, in evidence of which we are often reminded that dogs lick their wounds, and that these heal rapidly. It is scarcely necessary to say, however, that reasoning of this kind, based upon a comparison of the strongly alkaline saliva of the dog with the neutral saliva of man, is inadmissible. Others attribute, with more show of reason, the comparative immunity of the lower front teeth from decay to an antiseptic action of the saliva ; but since the lower molars are decidedly more subject to decay than the upper, they are obliged to restrict the antiseptic action to the secretion of the sublingual and submaxillary glands, which they assume to bathe only the front teeth, and to come not at all, or very little, into contact with the back teeth. These assumptions, besides being rather gratuitous, lead us into a dilemma when we attempt to apply them to other infectious diseases of the human mouth ; for instance, pyorrhea alveolaris, which shows a preference for the lower front teeth.

I doubt if there is anyone who would wish us to believe that the dead saliva has even the slightest antiseptic properties, in consideration of the fact that saliva, especially when it contains much organic matter, very readily putrefies. If the saliva possesses any such property, it must be sought for in its living histological elements, *i.e.*, in the living leucocytes or "phagocytes." Since these are furnished chiefly by the tonsils, it follows that they should afford their protection most of all to the lower molars, with which they first come in contact. If such were the case, we should hardly expect the lower molars to be the most liable to decay of all the teeth in the mouth. Besides, on the whole, it does not well harmonize with our views of what constitutes an antiseptic to apply this term to a liquid in which processes of fermentation are constantly going on. Finally, it is a very well known and universally recognized fact that wherever an infection has been brought about by an unclean instrument, by a bite, etc., the most active antiseptics must be resorted to in order to check or prevent a general infection. There certainly could be no hope of accomplishing this end by application of a substance whose antiseptic action, if it has any at all, is so weak that no one has as yet been able to detect it.

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* *Western Dental Journal*, February, 1890. See also Bulkley, "On the Dangers arising from Syphilis in the Practice of Dentistry."

I therefore attribute the fact that wounds in the mouth heal so rapidly, exclusively to the recuperative power of the parts, a view which is supported by the observation that where this power is lost, putrefactive processes may make most fearful ravages, as seen in cases of noma, stomacace, stomatitis scorbutica, stomatitis mercurialis, etc., notwithstanding the fact that these diseases are always accompanied by an increased flow of saliva.

It is consequently never safe to trust to the usually pronounced immunity of the gums toward infections, since they, under many abnormal conditions, lose their power of resistance altogether; and more than this, the mucous membrane of the mouth appears, *under all conditions* when slightly wounded, to furnish ready entrance to the germs of syphilis, if not to those of tuberculosis, diphtheria, etc.

We can never know what virus may be clinging to our instruments, nor can we with certainty predict the result of a wound upon the gums, cheeks, or lips with an unclean instrument. The case of the Amsterdam physician, who died from an infection caused by lancing the gums, should be a warning to us.

It is therefore our duty to our patients, to ourselves, and to our profession to see to it that the possibility of conveying virus from one mouth to another during dental operations is excluded with absolute certainty. It also stands to reason that in all operations upon the jaws and teeth we should, as far as possible, sterilize the field to be operated upon, since the danger of infecting the pulp or pericementum, or of producing a general infection through the germs in the patient's own mouth, is always present. This point, however, will be considered more fully on another occasion.

Methods of Sterilizing Instruments and Accessories.

Napkins

become sterilized by the boiling process to which they are subjected in washing.

A napkin which was badly soiled with blood and mucus from the mouth was cut into a number of small pieces and placed upon the surface of a plate of agar-agar. In no case in which the boiling was continued for ten minutes did any development of bacteria take place, and generally the pieces were found to be sterile in six minutes. We may therefore safely say that boiling for ten to fifteen minutes in soap-water furnishes a certain means of sterilizing napkins.

Coffer-dam

is a most fertile means for conveying infection from one mouth to another, and the number of germs I have found on pieces of rubber supposed to be well cleansed was surprising.

Small pieces of rubber-dam can be sterilized, as a rule, by exposing them for thirty minutes to a five per cent. solution of carbolic acid. It would not be safe, however, to count upon a perfect sterilization of large pieces such as we use in practice in less than two to three hours, and then only when the whole surface of each piece is freely exposed to the action of the antiseptic. The same object may be accomplished in about one-tenth of the time by boiling water.

Personally I never use the same piece of coffer-dam twice under any circumstances. The only excuse for doing so is the cost of the material; but by properly cutting we can get a piece large enough for the incisors and cuspids for one and one-half to two cents, for the bicuspids for two to three cents, and for the molars for three to four cents in the upper jaw; for the lower jaw add one cent to each category. The plea that the expense would be too great is therefore altogether illusory, because there is not, I venture to say, one practice in a hundred which will not remunerate the dentist a hundred-fold for this slight expenditure, since there is nothing about which patients are more skeptical than the subject of coffer-dam, and nothing which they appreciate more than a fresh piece for every operation.

Where, however, the necessity exists for repeatedly using the same piece of rubber-dam, boiling water is the proper, and, in fact, the only safe antiseptic that can be made use of.

Small pieces of rubber were, with very few exceptions, found to be completely sterile after boiling for six minutes. In practice, larger pieces should be boiled for fifteen minutes.

Drinking or rinsing glasses should be sterilized by boiling in pure water.

Instruments.

The question of the disinfection of surgical instruments is one which has given both surgeons and bacteriologists much to think and work upon, and only recently can it be said to have approached a definite solution. The method of sterilizing instruments by dry heat requires so much time that its application to dental instruments is out of the question.

The ideal antiseptic is a liquid which acts immediately upon bacteria without in any way injuring the instrument. While it might appear that quite a number of the antiseptics at our command would meet this requirement, it is in reality not the case. There is a vast difference between sterilizing liquids and sterilizing solid bodies, and an antiseptic which sterilizes a drop of water brought into it almost instantaneously may require a quarter of an hour or more to sterilize a solid body, particularly when it is coated with a layer of dried albuminous material, as our instruments are liable to be.

In order to test the efficiency of various antiseptics in sterilizing instruments, I have adopted the following

METHOD OF PROCEDURE.

Small cylindrical pieces of glass about 5 mm. in diameter and 4 to 8 mm. long were brought into a vessel containing a number of freshly-extracted teeth, and a few drops of water added. Here they were stirred about with a glass rod, so that they became coated with infectious matter. They were then dried at room temperature for twenty-four hours, or for two to three hours at blood temperature.

A number of them were then placed in a small sterilized glass vessel, covered with the liquid whose sterilizing power was to be tested, and a somewhat larger glass vessel placed over it, after the manner of a bell jar, to avoid the possibility of germs falling in from the air.

At given intervals the cover was lifted and a glass cylinder removed with sterilized pliers, washed in a small stream of sterile water, and conveyed to a tube of bouillon, which was then put into the incubator and kept at a temperature of 35° to 37°. If the bouillon remains clear for twenty-four to forty-eight hours we have evidence that the piece was sterile; if it becomes cloudy, we know that the contrary is true. We are accordingly able in this way to determine how much time is necessary for sterilization by different antiseptic solutions.

Naturally great precautions are requisite to avoid errors of experiment. We must be absolutely sure that every thing used, particularly the pliers and the rinsing water, is free from living germs, excepting of course the infected piece to be acted upon. We must also avoid coming into contact with anything on the way while conveying the glass piece to the tube of bouillon. It is advisable to especially prepare the culture-tubes by pushing the cotton stopper into the tube about half an inch beyond the mouth, and holding the mouth in a gas flame until the cotton becomes slightly charred, then drawing the cotton out with sterilized pliers, so that it may be readily grasped with the fingers. The object of this is to sterilize the mouth of the culture-tube, so that if we come in contact with it with the glass cylinder there will be no danger of the latter becoming infected thereby.

Other precautions which will suggest themselves to the bacteriological reader need not be referred to in detail.

I have satisfied myself by a large number of control experiments that there is no danger, on the one hand, of carrying over to the culture-tube so much of the antiseptic as to prevent the growth of such living bacteria as may still be present; nor, on the other hand, of an accidental infection by air germs, provided the experiment is carried out with proper precautions.

Besides glass cylinders I have made use of leaden bullets, shot, peas, and roots of teeth after filling the canals with cement.

Furthermore, in my later experiments I have used a pure culture of one of the most resistive bacteria found in the mouth, instead of decayed teeth for coating the glass cylinders, since we thereby obtain a more uniform coating, and consequently more uniform results.*

Tests were made with the following substances:

Carbolic acid in five per cent. aqueous solution and in pure form.

Lysol in five per cent. aqueous solutions.

Trichlorphenol in five per cent. aqueous solutions.

Sublimate in five per cent. aqueous solutions, also in the strength of 1 to 1000 water.

Benzoic acid in the strength of 1 to 300 water.

Permanganate of potash in five per cent. aqueous solutions.

Resorcine in ten per cent. aqueous solutions.

Peroxide of hydrogen in ten per cent. aqueous solutions.

Saccharin in concentrated alcoholic and aqueous solutions.

β-naphthol in five per cent. alcoholic solutions.

Pyoktanin in concentrated aqueous solutions.

Absolute alcohol.

Antiseptin in five per cent. aqueous solutions.

Sulphite of zinc in concentrated aqueous solutions.

The essential oils in five per cent. emulsions and in pure form.

RESULTS.

Some general results of interest were obtained, which may be first given:

1. The length of time necessary to sterilize a body by a chemical

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* I have used glass cylinders, bullets, etc., in these experiments simply because they are much more convenient to work with than instruments.

I gave them a coating of infectious material, not because our instruments are supposed, in practice, always to be in this condition, but because they *may be*, and I am afraid sometimes are, and our methods of sterilization should be sufficient for all cases.

agent depends greatly upon the character of the body as well as upon the character of the matter with which it is coated. Porous bodies, as may be readily understood, are more difficult to sterilize than non-porous ones. Peas, for example, required more time for sterilization than the glass cylinders.

Again, small bodies are more readily rendered sterile than larger ones ; for example, shot more readily than large bullets, and, by inference, excavators probably more readily than forceps.* Also the drier and more insoluble the material with which the body is coated, and the more liable it is to form inert compounds with the antiseptic, the more difficult it will be to sterilize. It is consequently above all things desirable to employ the antiseptic in a form in which the infectious matter is soluble, and this, in the vast majority of cases, will be in an aqueous solution.

Carbolic Acid.

The two per cent. to five per cent. aqueous solutions of this antiseptic have long been the most popular means of disinfecting instruments of whatever nature, and the impression exists among a great many that it is but necessary to dip the instrument in the solution for a fraction of a minute in order to render it completely sterile. This, however, is far from being the case, as will easily be seen from the record of experiments given below :

Body experimented upon.	Time of exposure.	Number of tests.	Sterile.	Not sterile.
Glass cylinders..	3 minutes.	6	0	6
" "	5 "	6	0	6
" "	7 "	2	0	2
" "	8 "	21	3	18
" "	9 "	8	3	5
" "	10 "	3	2	1
" "	12 "	7	4	3
" "	15 "	8	5	3
" "	20 "	9	7	2
Peas	10 "	6	0	6
"	14 "	4	0	4
"	18 "	3	0	3
Bullets	16 "	8	2	6
Shot	16 "	8	3	5

It will be seen from these results that even twenty minutes will not always suffice to sterilize small bodies by a five per cent. solution of carbolic acid. We cannot, even with moderate certainty, count upon a thorough sterilization in less than an hour. A large bur from the instrumentarium of a dental student, after being exposed for two hours to the action of the five per cent. solution, was found still to contain living germs.

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* I do not mean to say that this principle will invariably hold good. This question would have to be settled by experiment. In the case referred to, it may be that the bullets resisted the action of the antiseptic longer than the shot because they have a larger surface of contact with the bottom of the vessel.

The results obtained by Miguel* and Redard† are still more unfavorable to the carbolic acid solutions. These authors found that bodies infected with pus still carried living germs after being exposed to the action of a five per cent. solution of carbolic acid for twelve to twenty-four hours ; while Fränkel‡ kept threads carrying spores of anthrax for forty days in a five per cent. solution, and at the end of that time found that the spores still retained their power of development.

The experiments with concentrated carbolic acid gave results which are still more surprising. I have for some months been in the habit of dipping every instrument which I use in the mouth into concentrated carbolic acid immediately before using it, and labored under the impression that all micro-organisms would be devitalized instantaneously. I was consequently not a little surprised to find that of twenty-one pieces that had been exposed for varying periods of time ranging from one to twelve minutes, only two were sterilized.

This result is, however, not so very surprising when we take into consideration that the antiseptic, however powerful, cannot act upon the micro-organisms until it has dissolved or permeated the material in which they are imbedded.

Trichlorphenol

was also made use of in five per cent. aqueous solutions, with the results seen in the following table :

Body experimented upon.	Time of exposure.	Number of tests.	Sterile.	Not sterile.
Glass cylinders ...	7 minutes.	3	1	2
" "	8 "	19	5	14
" "	9 "	6	4	2
" " ...	12 "	6	4	2
" "	20 "	4	2	2
Peas	6 "	2	0	2
"	10 "	2	0	2
"	14 "	4	1	3
"	18 "	5	1	4
Bullets	16 "	7	1	6
Shot	16 "	7	5	2

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* Annuaire de Mont-Souris, 1880.

† Revue de Chirurgie, 1888.

‡ Zeitschrift für Hygiene, 1889. Bd. 6.

A comparison of these two tables indicates a slight advantage in favor of trichlorphenol; but shows, however, at the same time that the five per cent. solution is not adapted for the purpose of sterilizing dental instruments, since we cannot afford to spend an hour's time after every operation in sterilizing.

Lysol gave results nearly identical with those of trichlorphenol, and consequently need not receive especial consideration.

Bichloride of Mercury

in a five per cent. aqueous solution was found to be by far the most prompt in its action of all the substances tested, as will be seen by the accompanying table of results:

Body experimented upon.	Time of exposure.	Number of tests.	Sterile.	Not sterile.
Glass cylinders....	5 minutes.	6	5	1
" "	8 "	17	15	2
" " ...	9 "	8	7	1
" "	12 "	4	4	0
Peas	2 "	1	0	1
"	4 "	1	1	0
"	2, 4, and 6 minutes.	3	0	3

Unless for particularly exceptional cases, an action of fifteen to twenty minutes could be relied upon to produce a thorough sterilization of instruments; but the time required is, as seen, still so long as to render the bichloride of mercury in five per cent. aqueous solutions unsuitable for the purpose. More than this, the powerful action of bichloride upon the steel or iron very seriously interferes with its constant use for sterilizing instruments made of these materials.

It will not be at all necessary to refer to the results obtained by the various other substances tested. Suffice it to say that they all fell far short of those already mentioned. The ten per cent. solution of the *peroxide of hydrogen* came next to carbolic acid, but is considerably inferior to it. *The essential oils* in emulsions, as well as in pure form, utterly failed to produce the desired action.

Mixed Antiseptics.

The idea that by application of a mixture of two or more antiseptics a more rapid or powerful action may be obtained has found its expression in the various mixtures which have been recommended as mouth-washes. In the present case the thought occurred to me that by a combination of peroxide of hydrogen with some active antiseptic the former would tend to dissolve or break up the small particles of matter in which bacteria are usually inclosed, and thus render them more easily accessible to the other component of the mixture.

I accordingly applied tests to a five per cent. solution of trichlorphenol in peroxide of hydrogen, and invariably found that this solution acted slightly more rapidly than the simple five per cent. aqueous solution of trichlorphenol alone, or the peroxide of hydrogen alone. The improvement was, however, not so great as to encourage further experimentation in that direction.

Boiling Water.

After I had satisfied myself by about a thousand tests that none of the chemical antiseptics at present at our disposal meet the requirements of a rapid, convenient, and absolutely sure mode of sterilization for dental instruments, I turned my attention to boiling water, and very soon became convinced that this is so far superior to all other means for sterilizing, so easy of application, and so rapid in its action, that it must recommend itself to every practicing dentist and physician at once.

I have found boiling water to accomplish in two minutes as much as the chemical agents ordinarily used in half an hour, as will be seen by the following table of results:

Body experimented upon.	Time of exposure.	Number of tests.	Sterile.	Not-sterile.
Glass cylinders....	½ minute.	5	4	1
" "	1 "	10	9	1
" "	1½ minutes.	4	4	0
" "	2 to 3 "	15	14	1
" "	5 "	5	5	0

Experiments on other objects (peas, bullets, shot, etc.) gave corresponding results, so that I regard an exposure of three minutes to boiling water sufficient for sterilizing smaller dental instruments, *i.e.*, excavators, etc., unless they are particularly dirty; whereas for forceps it would be better to continue the action for five minutes.

Boiling Antiseptic Solutions,

such as five per cent. carbolic acid solution, act still more rapidly than simple boiling water. The disadvantages of such solutions will, however, be found to more than overbalance their greater rapidity of action.

Boiling Solution of Carbonate of Sodium.

I have found, in agreement with the results obtained by Schimmelbusch* and Behring,† that a one to two per cent. boiling solution of soda has a slightly stronger action than water alone. Its chief advantage, as pointed out by the first-named author, lies in the fact that the rusting which is liable to occur when the instruments are boiled in water is avoided by the addition of soda.

An exposure of three to five minutes to a boiling one to two per cent. solution of soda is consequently the means I wish to recommend for sterilizing dental as well as surgical instruments. It is to be emphasized that the solution must not be simply hot, but boiling, since the motion of the boiling water materially assists in rapidly raising the temperature of the instrument to 100° C., and at the same time loosens up any matter that may be clinging to the instrument.

To many the results of my experiments may appear incredible. To those, however, who have had access to the literature of the subject, and in particular have followed the more recent communications, they will cause no surprise.

The view to which we are forced by the results obtained by nearly all who have worked at this subject is well summed up by Schimmelbusch,‡ who says, "Anyone who is obliged to perform a number of operations in succession upon aseptic and infected objects with an instrumentarium kept in carbolic acid will soon become convinced, by failure in respect to the healing of the wound, of the inadequate disinfecting power of carbolic acid. Its disinfecting value in such cases may be placed at about zero."

In the foregoing communication no reference has been made to the mechanical means of cleansing instruments. Naturally a thorough brushing of the instrument and rinsing in pure water goes a great way toward freeing it from germs, but it can never completely disinfect it ; and whatever method of disinfecting we may use, the instruments should be first cleansed mechanically, though where boiling water is used for disinfecting, the mechanical cleansing beforehand may be virtually dispensed with. Furthermore, I wish to testify to the fact that although weak solutions of carbolic acid are very often illusory in their action, they are still better than nothing, and undoubtedly much good has resulted from their use ; but we have no right to subject our patients to even a slight risk of infection by a partially disinfected instrument, when a complete disinfection may be accomplished so readily.

The dentist or surgeon who communicates a disease, perchance syphilis, to his patient by the use of an impure instrument, has a burden of sin upon him greater than which there are but few. Besides, exquisite cleanliness and absolute freedom from germs constitute half the battle in many operations in dentistry as well as in surgery.

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* Arbeiten aus der chirurgischen Klinik V. Berlin, 1890.

† "Desinfection, Desinfectionsmittel and Desinfectionsmethoden." *Zeitschrift für Hygiene*, 1890. Bd. 9.

‡ *Loc. cit.*

Sterilization of Teeth for Transplantation and Implantation.

The possibility of transmitting infectious diseases by the operation of transplanting or implanting teeth renders it imperatively necessary that the teeth used for such purposes be absolutely free from living germs. It is generally accepted that the operator takes every possible precaution when he allows the tooth to lie for one-half to one hour in a one per cent. solution of carbolic acid, or in a 1 to 1000 solution of bichloride of mercury. The following experiment will, I think, convince every one that this treatment cannot be relied upon to bring about the desired result:

Two roots whose canals were thoroughly cleansed and filled with cement were placed for a short time in a culture of a pathogenic mouth-bacterium to be described in a later article. They were then dried and subjected, the one to the action of one per cent. carbolic acid, the other to a one-tenth per cent. solution of bichloride of mercury, sixty and sixty-five minutes respectively. Thereupon they were rinsed in sterilized water and placed in tubes containing bouillon. Not only was the bouillon in both tubes densely clouded in twenty-four hours, but a drop of it injected into the skin of a mouse sufficed to kill it in fifteen hours.

Particularly in order to reach such bacteria as may have penetrated into the lacunæ or chance vascular canals, a much longer action of the antiseptic is necessary, and to be perfectly certain that we have accomplished our object, we should have recourse to boiling water.

The Management of Enamel Margins.

BY G. V. BLACK, M.D., D.D.S., JACKSONVILLE, ILL.

(Concluded from page 447.)

Placing the Gold.

When a cavity has been prepared, the placing of the filling-material is almost purely a question of manipulation. All of the plans of the operation have been laid, the lines of the enamel margins determined, and the necessary contour of the filling for the restoration of proximate contact, the form of the interproximate space, esthetic proportions, etc., have been formulated in the mind of the operator. In filling the cavity it remains to complete these designs. I am conscious that but little of technics can be taught by written words. Skill with the fingers is acquired by close discriminating observation, followed by practice. Success is more dependent upon intuitive aptness, stimulated by contact with expert operators, and final rounding into completeness by personal endeavor, than upon what this or that writer may say of methods of procedures. All around the south shore of Asia Minor the coast is strewn with remains of the excellent handicraft of an ancient people who were unable to perpetuate their history in written language. Their culture was of another sort, inventive in a degree, but especially characterized by manual skill.

In the past, dentists of America have given their attention mostly to the finger-craft of their profession. This to a great extent was communicated from man to man by personal contact, much as the arts in gold-work, and building, were taught in ancient Troy. Now our plans are being rapidly changed : our young men are trained in schools where they listen to the formulation of manipulative procedures instead of observing day after day the manipulations of the skilled operator, and putting his demonstrations into practice. By this change in method we gain in culture, but we need to have a care that we do not lose in that manipulative skill for which we, as Americans, have become noted. It is therefore as important that students should have the best opportunities for the observation and practice of the technics of dentistry as for the study of the principles governing the conditions which render their manipulation necessary.

While skill in manipulation cannot be communicated by words, those who have acquired a fair degree of expertness may, by means of language, communicate to each other valuable information regarding manipulative procedures, and discuss the principles which underlie them. Otherwise I should have little excuse for writing this paper.

In filling a cavity which we have prepared there are two prime objects : (1) complete water-tight closure of every part of the cavity; (2) the production of a form that will promote cleanliness of the immediately adjacent destructible parts of the tooth, and best serve the mechanical and esthetic requirements. My task in this paper is principally with the first of these.

Other subjects relating to the filling of the cavity are secondary to the complete water-tight closure of every part of the margin. If this is not accomplished, all skill displayed in other portions of the work comes to naught. Then how can we make water-tight margins in the largest percentage of cases? I might answer, by acquiring great skill in manipulating gold, and answer correctly in the largest sense. There is probably no one plan of manipulation yet devised that will give in all cases the best attainable results to every individual. The teaching of dental technics has not been so unified that all have worked on the same lines. I was taught certain plans in the beginning; but through observation and practical trial have diverged from those plans. Others have done the same, until many plans are now used to produce like results. One uses only cohesive gold. Another combines its use with that of non-cohesive foil. Still another prefers crystal gold. One uses mats, another pellets, another folded gold, another cylinders, etc. It is not a question of the particular form in which the material is prepared, but rather of the placing of the gold, and of the character and handling of the condensing instruments. True, the gold should be well prepared, whatever its form, and protected from certain sources of injury. Non-cohesive gold should have a high degree of toughness; cohesive gold should have the welding property well developed, etc.

I propose to grant as satisfactory all of these forms and conditions of the gold, and a wide range of instruments, and yet there are certain rules of procedure that are especially useful in making water-tight margins which I wish to discuss.

Cohesive Gold.

When cohesive gold is used alone, no definite arrangement of the laminæ of the foil need be observed. They may be either crumpled or laid flat. The integrity of the mass formed depends upon welding the parts together, and these parts may be built one upon another successively until the filling is completed. This would seem to indicate that the manipulation is perfectly simple, and that no especial rules need be observed,—a mistake that has cost our people thousands of good teeth. The difficulty is not in making a firm mass of gold, but rather in adapting the material perfectly to the walls and marginal edges of the cavity. A cavity apparently filled ever so perfectly, if done without rule in the placement of the gold and attention to the lines of force used in condensing, is generally imperfect at the margins, unless, indeed, rule has been unconsciously observed.

Lines of Force.

In filling proximate cavities in bicuspids and molars, the marginal edges are approached by the condensing instrument from two principal directions: namely, at right angles to the line of the cavity-wall and marginal edge, as in the cervical portion, and parallel with the line of the wall and enamel margin as in the buccal and lingual marginal lines. While these lines of approach, or lines of force, as they may be called, are modified so as to include every conceivable angle, we may say that when they are less than forty-five degrees from perpendicular to the line of the cavity-wall and enamel margin they are in effect perpendicular, and when more than forty-five degrees they are in effect to be regarded as parallel. The first is not improved by being slightly inclined from the perpendicular, but the second is better for being a few degrees removed from the parallel lines. These different directions of the lines of force call for fundamental differences in the rules of procedure.

Line of Force perpendicular to Cavity-Wall and Line of Margin.

Rule : *Do not build cohesive gold over the cervical marginal edge of the cavity until a firm mass, to which the projecting portion may be fixed, has been formed in the interior of the cavity and built close to the marginal edge.*

The object of this procedure is twofold. First, a mass of gold is to be fixed securely to prevent movement of the whole after gold is once condensed on the marginal edge, for such a movement is fatal to the perfect closure of the margin. It can never be so replaced as to make a tight joint. Therefore the placing of cohesive gold should be confined to the internal parts of the cavity until it is found to be secure in its position.

Second, if a thin lamina of gold is condensed against the cavity-wall extending over the marginal edge at some little distance from the fixed point, it is liable to be curled away from the marginal edge by the force used in condensing. This statement will be discussed later.

FIG. 41.

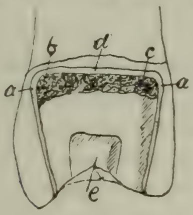

FIG. 42.

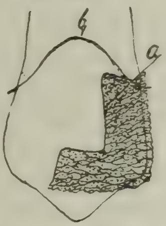

FIG. 41. Outline of an upper bicuspid with cavity in proximate surface prepared for filling, and the first part of the filling placed. *a*, *a*, marginal edge at the angles of the cavity; *b*, *c*, gold built across from the lingual to the buccal wall, but not over the cervical marginal edge *d*. *e*, shallow slot cut into the grinding-surface for anchorage.

FIG. 42. Outline of upper bicuspid showing the filling in section. *a*, line to which the gold should be built before any gold is placed on the marginal edge.

The plan of procedure and the reasons therefor will be better understood by reference to the illustrations. *a*, *a*, *d*, Fig. 41, represents the lines of the enamel margin and marginal edge in case of a proximate cavity in an upper bicuspid, and *b*, *c* represents the angles of the cavity partially filled with gold. First, a suitable mass* of gold may be condensed into the more convenient angle, say the lingual *c*, and

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*I use the word *mass* in this paper instead of cylinder, pellet, block, mat, etc., for the reason that I do not wish to convey the idea that any one of these forms is necessarily employed.

fixed in a pit, groove, or some form of slight undercut; or if the form is not such as will hold securely, it may be held in position with a second instrument and more gold added, building across toward the opposite angle *b*, being careful not to carry the gold over the marginal edge until the angle *b* is reached and firmly filled. Now the mass of condensed gold ought to be secure in its position if the cavity has been well formed for filling with cohesive gold. This is now to be built out close to, but not over, the marginal edge and thickened as much as is consistent with ease of access to the marginal edge, say to line *a*, in Fig. 42, which shows the filling in section. Now larger masses of gold may be laid on so as to extend from the interior of the cavity out over the marginal edge. The first condensation of these should fix them firmly to the gold previously condensed, and then the outlying portion may be condensed lightly against the marginal edge, with care that there is no sliding movement. In this way piece after piece is added until the entire cervical marginal edge is covered, always condensing against the firm mass of gold first, and over the margin last. In this last condensation it is well to use a foot-shaped instrument or its equivalent, so placed that the heel shall rest on the firm mass of gold and the toe extend over the marginal edge. This should be so held that the condensing surface is on the same plane as the cut surface or bevel of the marginal edge of the cavity. By this order of procedure the first object—the prevention of the movement of the whole mass of gold after building over the marginal edge—is accomplished.

Why build out close to the marginal edge before condensing the gold over the edge? There are two reasons for this, which I will try to illustrate. First, if a straight bar of soft metal be laid on the face of an anvil and one end fixed, it is seen to touch at every point, as at *b*, in Fig. 43. If the bar is now struck a smart blow with a hammer near its middle, *the free end will be curved away from the face of the anvil* as seen at *d*, and it will be vain to try to make it fit again by any amount of hammering. Second, if a piece of soft metal plate is laid on the smooth face of an anvil and is seen to touch at every point as at *b*, Fig. 44, and is struck with a hammer near its edge, it will be curled away from the anvil on either side of the point of the stroke as shown at *d*.

These experiments illustrate what will almost inevitably happen if a thin lamina of gold be fixed in the interior of the cavity and extended over a marginal edge at some distance and condensed. Especially, the least over-condensation causes it to spring away from the margin sufficiently to cause a leaky joint. Therefore as thick a mass of gold as is practicable should be built up very close to the edge, in order to give the least possible opportunity for springing away.

The second form of curling away is still more dangerous to the margin, and is where even careful operators most often secure imperfect results. If gold is carried over a marginal edge only a very little distance from a thick, firm mass and condensed by perpendicular force, the least pressure more than sufficient for condensation causes the gold to curl away from the marginal wall on either side of the instrument. This curling is the effect of a lateral expansion of the metal, and will occur with every blow that is more than sufficient for condensation. Every operator who has not made practical trial of the experiments just related should do so, and study carefully the effect produced. The most practical form of the second experiment is made by taking a piece of pure gold plate of 28 or 30 gauge and carefully flattening it on an anvil. See that it is well annealed. Then with a plugger-point and mallet strike it near to but not immediately on the edge, and watch the effect. Begin with light blows, and increase the force until lateral expansion and curling occurs. Then with the same plugger make the effort to fit the margin of the plate down to the face of the anvil again. It will be found that this is only possible when light force is used.

FIG. 43.

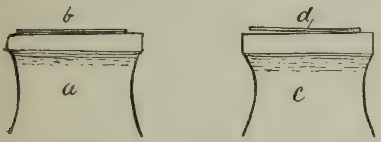


FIG. 44.

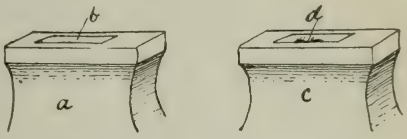


FIG. 43. *a*, outline of small anvil, with a bar of soft metal, *b*, which lies flat, touching at every point. On anvil *c* the same is represented after a smart stroke on the bar of soft metal with a hammer at the point *d*. It will be seen that the end of the bar *e* no longer fits the face of the anvil, but has been curved away from it by the stroke of the hammer.

FIG. 44. *a*, outline of small anvil, with a piece of soft metal plate, *b*, touching at every point. On the anvil *c* the same metal plate is represented after having received a smart blow at the point *d*. It will be noted that on either side of the point receiving the blow the metal is curved away from the face of the anvil. In order that this effect may be produced, the force of the blow must be sufficient to cause some lateral expansion of the metal.

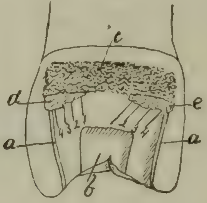
In any case in which a marginal edge is to be covered with cohesive gold by perpendicular force the malleting must be light, or hand-pressure used, until thickness enough has been laid on to prevent lateral expansion. Neither will failure to condense answer, though of the two it does seem that a failure of perfect condensation in the first instance is safer than over-malleting, for it is easier to remedy by after marginal condensation, of which I will speak later.

It is important that the operator cultivate carefully his sense of touch and hearing, that he may appreciate quickly the *touch and tone of solidity*. "The anvil tone" it has been called. By this he may know when his gold is condensed and when he has passed the danger line. It is only after the condition of solidity has been attained that we get lateral expansion. The force used in condensing may be increased as the thickness of gold over the marginal edge is increased, for thickness rapidly diminishes the liability to curl.

Line of Force parallel with Cavity-Wall and Line of Margin.

On margins where the line of force is parallel with or slightly inclined toward the marginal line and cavity-wall, as is usually the case with the buccal and lingual walls and marginal lines in bicuspids and molars, the conditions are different from those upon which perpendicular lines of force are used and require different rules of procedure. A species of wedging against the cavity-wall should be combined with the act of condensation.

FIG. 45.



Outline of an upper bicuspid with cavity, and filling partly built in. *a, a*, marginal lines of cavity; *b*, shallow slot cut into crown for anchorage; *c*, part of filling built in; *d*, mass of gold laid on ready for condensation.

The lines 1, 2, 3, 4, represent the directions of force used in condensing, and the numbers represent the order in which the different parts should be condensed, beginning at 1, and finishing at 4. *e* represents a mass of gold similarly laid against the lingual wall, and the figures 1, 2, 3, 4, the order of the condensation. Here the line of force is inclined more toward the cavity-wall than upon the buccal. It will be seen that in each instance the last portion condensed will be wedged between the condensed gold and the cavity-wall.

Rule: *In building up to a cavity-wall and marginal edge where the line of force is parallel with or inclined toward the wall and edge, as is generally the case with the buccal and lingual walls and marginal lines of the bicuspids and molars, lay on the mass of gold and begin condensing in the interior of the cavity, then move step by step toward the wall until it is reached, and condense last against the bevel of the marginal edge.*

By this mode of procedure the act of condensing and wedging against the wall and edge is accomplished in a way that will make water-tight margins. This I have illustrated in Fig. 45, which represents a bicuspid with a proximate cavity about one-third filled; *e* indicates a mass of gold laid against the lingual wall, and carried over the marginal edge. The condensation is begun at 1, and the line represents the line of force. The condensation proceeds in the order of the figures 1, 2, 3, 4, finishing at the wall, then along the wall to the marginal edge. By this order, in the act of condensing that portion of gold next to the wall, it is also wedged between the wall and the last portion of gold condensed, making a tight joint. If the order is reversed, we not only lose this act of wedging, but the first condensation to the wall is likely to be pulled away by condensing the next portion. In this condensation lateral expansion is not an element of danger, except in case of frail walls, for the greater the lateral expansion the tighter the wedging. This method of procedure is much more simple and certain in its results than filling over margins where perpendicular lines of force are used. It is desirable therefore whenever practicable to use lines of force parallel with or inclined toward the walls and marginal edges.

Divergent Lines of Force.

It is often inconvenient or undesirable to so prepare cavities that at every point lines of force parallel with or inclined toward the walls can be used with mallet-pressure. Or, in other words, at some points any line of force that can be used with direct instruments will be directed more or less *away from the line of the cavity-wall and margin.* I shall designate the lines required in these cases as *divergent lines of force.* In any such case direct mallet-pressure is inadmissible. Hand-pressure or reverse pluggers must be used in order to secure the application of force in correct lines. I have illustrated this in Figs. 46 and 47. In Fig. 46 I have represented in outline a proximate cavity in a lower bicuspid in which the line of mallet force cannot be brought parallel with the line of the buccal wall of the cavity. In this case a curved instrument is readily brought parallel with the cavity-wall. But when mallet force is applied the direction of the force is in the direction

FIG. 46.

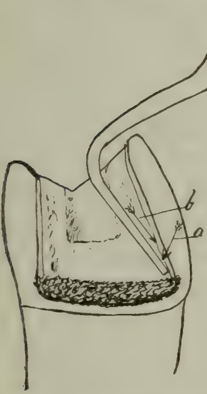


FIG. 47.

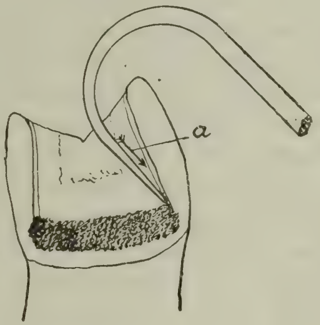


FIG. 46. Outline of a lower second bicuspid with a distal cavity partly filled. The tooth is in such position that mallet-pressure with direct pluggers cannot be brought parallel with the buccal wall of the cavity. *a*, arrow showing the line of mallet-pressure; *b*, arrow showing the line of force required, and which may be obtained with hand-pressure.

FIG. 47. The same conditions are represented as in Fig. 46. The position of the point of the reverse plugger for obtaining mallet-pressure in the required line of force is shown.

of the arrow *a*, and will carry the gold *away from the line of the cavity-wall.* A good margin cannot be made in this way. The required line of force is divergent from *a*, and is marked by the arrow *b*. This may be obtained by hand-pressure or by reverse pluggers, as shown in Fig. 47. In the latter case the mallet-pressure is applied in the reverse direction, and the point of the instrument so curved as to reach the desired point and apply the force in the direction indicated by the arrow *a*. This plan meets the requirements in many cases, but many will also be met with in which hand-pressure must be used to insure good margins. These divergent lines of force are required many times in filling proximate cavities in the incisors, as well as in the bicuspids and molars. Failure to appreciate these conditions and to obtain the correct lines of force are responsible for many failures.

Lines of Force parallel with the Cavity-Wall and at Right Angles to the Lines of the Margin.

The conditions in filling up to the marginal edge in grinding-surfaces are much the same as in filling up to labial and lingual walls in bicuspids and molars, and the same rule applies. While the lines of the enamel margins are not parallel with the lines of force, the cavity-walls are. The movements or stepping of the instrument from point to point in the act of condensing should be from the center toward the wall or margin of the cavity. Any amount of force consistent with the strength of the tooth or of the cavity-walls may be used; but malleting continued after the anvil tone is heard is not only useless but barbarous. Special care should be observed not to injure the margin with the instrument. Condensing instruments should not, under any circumstances, be brought in contact with the enamel.

Marginal Condensation.

The line of force for condensing those margins of proximate fillings where the lines of force used in placing the gold have been perpendicular to or parallel with the marginal lines (cervical, buccal, and lingual marginal lines) should, after the placing of the filling is otherwise complete, be directed across the long axis of the tooth. This I shall distinguish as marginal condensation. This condensation should usually be made with foot-pluggers that will pass freely into the interproximate space and reach all parts of the cervical marginal line, as well as the lingual and buccal. In order to properly reach the margins of distal cavities in bicuspids and molars, reverse pluggers are necessary. Generally, mallet-pressure at right angles with the lines of force used in primary condensation should not be made until the filling has all been placed, or, at any rate, not until a considerable mass has been added to that upon which such mallet force is brought. Otherwise the tendency to lateral spreading of the metal may start from the margin the unsupported gold last placed and cause a leaky spot. For instance, if a proximate cavity in a bicuspid is filled half-way from the cervical wall to the occluding surface, the cervical margin may generally be safely condensed by a foot-plugger passed into the interproximate space. But this condensation should not be carried along the lingual and buccal walls fully to the highest point to which the filling has been carried, because pressure from this direction is calculated to spread the metal laterally and force some of the last gold placed away from the marginal edge. When margins can be condensed conveniently on a line of force inclined at an angle of forty-five degrees or less to the marginal line while placing the gold, it is well. But if marginal condensation at right angles with the line of force used in building the filling is done at all during the progress of the building, it should be kept some distance in the rear. Unless there will be difficulty in reaching some parts of the margin, such condensation is best deferred to the last, for then the metal is confined on all sides, giving the best conditions for the most effective condensation ; and any reasonable force may be used, for lateral spreading of the metal under these conditions will more nearly produce perfect margins. This applies to all fillings made under the conditions named as to lines of force, whether made of cohesive or non-cohesive gold. If at some portion of the margin the gold has been built out so far that the condensation is not effective on the marginal edge, it should be partly removed before the condensation is made. No other form of condensation is so efficient in perfecting margins as this, and it should be rigorously and carefully employed.

THE USE OF NON-COHESIVE FOIL.

I know of but few dentists who now habitually make any kind of fillings exclusively with non-cohesive gold foil. Since the advent of cohesive gold the art of working non-cohesive gold seems to have been lost, except to the few. Of course very excellent fillings may be made by that method, now as formerly, in cavities suited for it, but I fancy that but few will now take the trouble to learn the old "wedging in" process so as to use it effectively, and with facility. There is no need now for this method of work, except such of it as will serve us in combining the two kinds of foil for insuring good margins in difficult places, and for ease and rapidity of manipulation.

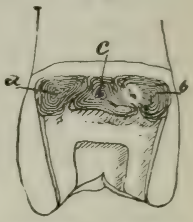
When non-cohesive foil is used, it should be either smoothly folded into suitable form or rolled into cylinders. At least the sheets of foil should not be so crumpled that the direction of the laminæ is lost. In use the gold is so laid in the cavity that the laminæ shall extend from the interior to the exterior ; the edges of the laminæ of the foil should form the exterior surface of the filling. Gold used in the non-cohesive condition may be condensed into a sufficiently solid mass, and is held together, not by cohesion, but by the laminæ being confined by the walls of the cavity in which it is placed. Therefore the process of non-cohesive gold filling was a process of "wedging in," and it was important that the edges of the laminæ should form the surface of the filling in order that it should not waste. In using non-cohesive gold in conjunction with cohesive gold this rule should be strictly observed if any part of the external surface of the filling is to be formed of the non-cohesive gold. In this use of non-cohesive foil it is bound in its position by building cohesive gold upon it so as to form one wall of support to it, or of that portion of the cavity filled with it. No rule of placement of the laminæ need be observed when non-cohesive foil is used in deep cavities with four walls, simply for ease of filling in, as in large occluding surface cavities in the molars, and is not made to form a part of the exposed surface.

The most important use of non-cohesive foil at present is in the cervical portion of proximate cavities. In antebellum days we did not cut proximate cavities out to the grinding-surface, and if they were broken out we generally cut away the proximate surface of the tooth until something near a flat surface could be given the mouth of the cavity. In other words, we converted the cavity into one with four walls. Now in cavities that have been cut out to the grinding-surface we may fill such portion of the proximate cavity as we may desire with non-cohesive foil, and then form the occluding face by building in cohesive gold.

The methods for its introduction as a filling are based upon the fact that it does not weld into a solid mass, and therefore has not the same disposition to curl away from the margins under direct condensation as cohesive gold, nor does it become unyielding when condensed, but by the application of a reasonable degree of force its laminæ may still be moved upon each other. Therefore if it should be sprung away from the marginal edge by some error in direct condensation, it is readily brought back to perfect adaptation by marginal condensation. It is therefore important that foil for this use should be strictly non-cohesive, for any cohesion of the laminæ defeats the accomplishment of the object intended. This form of gold may also, on account of the ease of condensing it, be used in larger masses than cohesive foil, which abridges the time and labor of building large fillings and reduces the wear and tear on the patient.

In beginning fillings in proximate cavities in bicuspids and molars, smoothly-rolled cylinders of non-cohesive gold may be used with the greatest advantage to cover the cervical margin, or even all of that portion of the cavity-wall on which the perpendicular line of force will be used in condensing. The cylinders should be of suitable size and length for the particular cavity in hand. The first one should be as large as will go easily into the cavity without condensation or disturbance of its laminæ, and long enough for one end to abut against the inner wall while the other lies fully out over the margin. This should now be pushed into one of the cervical angles (Fig. 48, *a*) with a broad-tread plugger. Another similar cylinder may now be laid in and pushed into the opposite cervical angle, *b*. Generally a third cylinder, *c*, may be placed between these, making a thick covering for the central portion of the cervical wall and margin. In this way I often place from six to twelve grains of gold in three cylinders in large proximate cavities in molars, especially those from which the pulp has been removed. These are now moderately condensed with a broad point, holding the central cylinder in the mean time with a second instrument. At this point the use of cohesive gold may begin, or if desired, another layer of cylinders may be placed. The choice in this should depend largely on the form of the cavity, especially as to the position, form, and strength of the anchorage. When the anchorage is slight, less non-cohesive gold should be used than when there is abundant anchorage. Often the greater part of proximate cavities may be judiciously and quickly filled with non-cohesive foil when the anchorage is such that a small amount of cohesive gold at the occluding surface will make the retention amply secure. But the first layer of cylinders is sufficient for the purpose of securing good margins, and any additional non-cohesive gold would be used to expedite the filling.

FIG. 48.



Bicuspid tooth with cylinders placed on cervical wall and marginal edge ready for condensation. *a*, buccal cylinder pushed into place; *b*, lingual cylinder; *c*, central cylinder.

In beginning the placing of cohesive gold, a fairly large mass should be condensed upon the non-cohesive gold toward one of the cervical angles of the cavity, and be firmly held in position by transferring the second instrument to it. Then mass after mass should be added, building across the interior part of the cavity, upon the inner ends of the cylinders, to the opposite wall. The filling should be held firmly in position by slight grooves in the buccal and lingual walls. Cohesive gold may now be built out to the ends of the cylinders, and the whole marginal portion condensed firmly against the cervical wall and angles by heavy mallet-pressure. The remainder of the cavity may be filled as described for the use of cohesive gold exclusively.

I scarcely know how to sufficiently emphasize the advantage of building cohesive gold across from wall to wall of the cavity, binding down the inner ends of the cylinders, before the final direct condensation upon the marginal edge. This is done to prevent further movement or sliding of the non-cohesive foil. It is often a difficult point in making the filling. The novice is apt to wedge his cohesive gold between the ends of the cylinders and the interior wall of the cavity, and slide them out, instead of building the non-cohesive gold on. A correct conception of what is to be done should avert this mistake. With this point correctly managed, the liability of making a bad joint at the cervical margin of a properly prepared cavity becomes very slight.

If the cavity is too shallow, or necessarily of a form that will not admit of this building across on a layer of cylinders, it will generally be best to secure some form of retaining-point or undercut and fill entirely with cohesive gold. Otherwise holding with a second instrument must be depended upon for building over the marginal edge and continuing the filling to anchorage near the grinding-surface. Many expert operators may do this satisfactorily, but it involves very close, painstaking labor with many chances of defeat in the end, and the necessity for such work may generally be avoided by skillful preparation of the cavity.

The filling of that part of the cavity which must be done with the line of force perpendicular to the wall and line of the marginal edge, the cervical wall, and point of greatest danger, is in this way secured by the use of non-cohesive gold. The lines of the buccal and lingual margins are in position for the use of lines of force parallel to or inclined toward them, giving the opportunity for the use of the wedging method in condensing. The use of cohesive gold is much safer here, but if it is desired, these walls and marginal edges may readily be lined with non-cohesive gold without materially weakening the retention of the filling. For this purpose a small cylinder of non-cohesive foil is laid against the lingual or buccal wall, pressed lightly to place, and a mass of cohesive gold laid on so as to partly cover it. This is now condensed, beginning at the central part of the cavity and condensing toward the wall until it is reached, and then from the deeper portions of the wall to the marginal edge. The non-cohesive gold is condensed together with the cohesive, which serves to hold it firmly in place. The central portion of the cavity may now receive its portion of cohesive gold, and then another cylinder is placed against the opposite wall and partially covered with a mass of cohesive gold and condensed as before described. This process is then continued as far as may be desired, covering the walls and margins with the easily adaptable non-cohesive foil. Generally I do not extend the non-cohesive foil quite to the occluding portions of the margins. There is certainly no necessity for it on the plea of making more perfect margins in positions so fully exposed to the eye, and where the direction of the force used in condensing is so fully under control. A perfect cohesive margin will stand more wear and tear on a grinding-surface than a perfect non-cohesive margin.

This plan of lining the walls and margins gives all of the advantages of non-cohesive gold and makes stronger work, when that is required, than filling the bulk of the cavity with non-cohesive foil. It is about as laborious, however, as filling this part of the cavity entirely with cohesive gold.

The marginal condensation should be proceeded with as when cohesive gold has been used. In case a long cylinder has extended considerably past the margin, it should be cut away before the final condensation in order that the force may be expended on that part of the metal which forms the margin of the completed filling. This point is important. It is of little avail to mallet on a heavy extension of gold and then trim to completion. Trim first sufficiently to cause the pressure to be expended upon the gold that will form the completed margin.

TIN.

I do not care to enter into the question of the use of tin and gold further than to mention the use of tin on cervical marginal edges. This practice seems to have become popular of late years, and represents one of the general acknowledgments of the difficulty experienced in preventing recurrence of decay in these localities. I must say, however, that I have been unable to see any really good reason for its use. Good margins can be made with it,—and possibly it may be a little easier to learn to manipulate it than non-cohesive gold. This difference seems to me inconsiderable, and insufficient to counterbalance the objections to tin. Margins made of tin become dark and unsightly, and they often give the impression that decay has recurred, leading every one who may examine the mouth to question them. Tin is so soft that the point of an explorer may be easily thrust into it. Not unfrequently good margins have been seriously injured in this way. Certainly just as good margins may be made with non-cohesive gold foil, to which these objections do not apply.

THE MATRIX.

The matter of the use of the matrix in filling proximate cavities with gold has developed considerable literature within the last two decades; and the number of devices that have been offered in the market, and sold, seems to indicate an appreciation of a need that is being supplied. I had hoped that this device would lessen the labor of making proximate fillings without reducing the percentage of water-tight margins. I have therefore tried all these devices, and have observed their use in the hands of others with much care. My conclusion is, that if they are so used as to facilitate the filling, the margin is endangered, or if so used that the margin is not endangered the filling is not facilitated. This applies to the general use of the matrix in making proximate fillings with gold. Cases occur now and then in which it may be used with advantage if used skillfully, but for the mass of operations the form of the marginal edges of the cavity should be such as to make filling inside a matrix more difficult than filling without it, provided the same perfection of margin is attained. In filling proximate cavities with amalgam the matrix finds its true place of usefulness. A full discussion of the advantages and disadvantages of the use of the matrix would lead me beyond the limits of this paper.

TRIMMING TO FORM AND FINISHING FILLINGS.

Trimming to form and finishing fillings is not less important than the placing and condensing of the filling-material. It is in the finishing that the margin, to which the gold has been properly adapted, is perfected and made to serve the end in view,—the prevention of the recurrence of decay. Perfect finish of margins, so that there is neither overlap nor want of fullness, has generally been insisted upon. But this is not enough. Not only the margins, but the whole surface of the filling, should be trimmed to a form well calculated to protect the tissues of the interproximate space from injury by the wedging in of food, and the tooth-structure adjacent to the margins from lodgment of *débris*. The matter of form I have perhaps indicated sufficiently in other papers. Here it is my purpose to speak rather of the manner of trimming than of the form to be attained. In this matter I am met with a greater difficulty than in any other subject on which I have written.

When I glance back over the history of the progress in filling teeth, it is a matter of much surprise that there should have been so little change in the modes of trimming fillings to form and in the instruments used for that purpose. For more than a half-century the separating file has held sway as the principal instrument without other change of form than the introduction of thinner blades, and during this time our idea of the form required has radically changed. The new instruments introduced have been those for rotary motion, and new and better varieties of tape, all of which are calculated to facilitate the polishing rather than the trimming of proximate surfaces. The double-end files now offered in the market are not materially different from those of antebellum days. The poverty of new designs in instruments for trimming proximate fillings sufficiently illustrates the lack of progress in this particular portion of operative dentistry. This also accounts, in some degree, for the favor which the matrix has received, since one of the objects of this device has been to limit the trimming necessary to a smaller amount. The separating file was good when only flat-faced fillings were to be made, but now when we wish to give our fillings other forms the separating file should go into the same drawer with the old line condensing instruments for exclusively non-cohesive gold foil, and labeled "good upon occasion, but not in general use." Many individuals have, perhaps, devised new patterns of instruments for trimming fillings, made and used them, as I have done myself. But few of these have been manufactured, or if so have not found such favor in the market as would justify manufacturers in perfecting and continuing them. One thing the profession may regard as a fixed fact: If they would have instruments well adapted to the work of trimming fillings to form, they must pay prices that will justify the highest skill in their manufacture. Up to this time the instruments designed for this purpose are clumsy, ill adapted, cheaply made, and without finish, as compared with condensing instruments. The only well-finished instruments for this purpose that I have seen are those that I have had made on special order for my own use. Manufacturers have generally told me they could not sell these instruments. Though some have promised to try them on the market, they have not yet appeared.*

The instruments I am using may not be the best forms. The best forms are more likely to be a growth from form to form, corrected and improved as they pass through different hands until the forms best adapted to the use of the majority of skillful men are reached. This relates to proximate surfaces only. Occluding and most other surfaces can be trimmed by rotary instruments. But rotary instruments for trimming proximate surfaces to form I must regard as a failure.

The difficulties with instruments for this purpose now to be obtained are, first, failure to produce the desired form expeditiously; second, needless injury to the soft tissues of the interproximate space. In the attempt to trim a cervical margin with a separating file the tissues are lacerated by the saw on its edge, and often their destruction is almost completed by the tape or disk, and still the filling cannot readily be trimmed to the desired form. The usual double-ended files are not much better.

The needed instruments, in my judgment, should be something as follows: a thin saw held in a rigid frame to pass between the teeth when a proximate filling has been condensed close against the neighboring tooth. With this its use ceases, as it is only used to admit the next instrument. It should be the only instrument presenting a cutting-edge to the soft tissues of the interproximate space. A saw not much larger than a horse-hair, also held in a frame, and used with the cutting-edge toward the occluding surfaces of the teeth (I make this saw by grinding from the back of the thinnest Kaeber saw until it is reduced to a mere thread). This is insinuated between the soft tissues of the interproximate space and the overhang of the cervical margin of the filling, and the cutting for the purpose of trimming away the surplus metal is done toward the occluding surfaces. The smooth, polished surface of the back of this thread of a saw does not tear the soft tissues with which it comes in contact. With this saw the surplus metal overhanging the central part of the interproximate space may be removed, giving room in which to work expeditiously with properly shaped files. We need an entirely new list of files. They should have the best cutting quality for fine gold (probably file-cut and stoned, instead of chisel-cut), and the greater number made to cut with a pulling motion. The back and edge of each blade should be finely polished so that it may not tear the soft tissues with which it comes in contact. The forms should be such that every portion of every proximate surface and the angles of the teeth may be readily reached and fillings trimmed to the desired form. They should be delicately made and skillfully tempered for their special use. This would require from eight to twelve forms. Add to these three or four forms of sharp-edged trimmers, made to cut with a pulling motion, for seeking out overlaps and for delicate trimming. These should be capable of working anywhere in the interproximate spaces or about the angles of the teeth.

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* Since writing the above, the manufacture of these instruments has been announced, and they can now be had.

The margins of fillings should be tried at every point with the sharp-edged trimmers, sliding the edge from the surface of the enamel onto the surface of the gold, so that it will catch any overlap, continuing until it glides smoothly from the enamel to the gold at all points of the marginal lines.

With such a set of instruments made as our skillful manufacturers can, it becomes practicable to finish proximate surfaces and the angles of fillings to form, with the minimum of injury to the soft parts, and to reduce the use of the tape and disk to their legitimate work of polishing, instead of improperly using them also for trimming. But the use of new forms of instruments requires practice of hand with each individual form, and their general employment must be a matter of growth.

In polishing proximate surfaces the disk should not be used unless the space is wide enough to admit it without danger of cutting away the contact point. The disk is probably responsible for more failure of fillings due to improper form of contact in so-called contour fillings than any other instrument. When used between the teeth, the tendency is to cut most where the least is intended, and the result is wedging of food between the teeth instead of forming a contact that will prevent this form of disaster. The rim disks are less objectionable. Fine, narrow tape is still less objectionable, and if skillfully used will do the work better. But in many cases great care is required to prevent serious injury to the soft tissues. The polish should be as good as our finest polishing-powders will make. The steel burnisher should be converted into some other form of instrument, or at least put in the bottom of the drawer under the other instruments for making exclusively non-cohesive gold fillings. It can do no good, and is liable to do much harm to the margins of fillings.

EDUCATION AND LEGISLATION.

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(Delivered before the Dental Society of the State of New York, May 13, 1891.)

A YEAR ago last December I had the honor to address the First District Dental Society of New York upon a subject which it seemed to me might be considered fundamental so far as the future of dentistry was concerned, and which from various causes, some honorable and some unworthy, had been generally ignored, or touched upon so lightly or with such timidity that my paper upon a well-worn subject seemed to many original, timely, and courageous, as I gather from the expressions and letters of hearers and readers in different sections of the country.

The simple fact was, that with no ambition to pose as a fault-finder, I was rudely and irresistibly, in the pursuance of my official work, brought face to face with what seemed to me stubborn facts, and "with malice toward none and charity toward all," I put these facts and deductions together and presented them for the benefit of all concerned. While my effort was not of much merit, it did, I feel, stimulate the thoughts of many, and has resulted in an awakening which will, in the end, bring abundant and useful fruit.

With an extended experience of the results of college training from the examination of fifty graduates since my former paper, and with another year's observation and study of dental legislation, I invite your attention to a consideration of some points connected with this great subject.

Writers and speakers keep reiterating the claim that when a state has granted a charter to an educational institution empowering it to grant degrees with all the rights and privileges pertaining thereto, it has made that institution and the recipients of its degrees superior to such police laws as the state may in its sovereign wisdom afterward find to be necessary for the protection of society.

I said in my former address, and I repeat it, that college charters differ in no respect from other corporation charters; the essential principles are perpetuity, unaffected by the disagreements or deaths of partners, the right to hold and manage property in a corporate capacity, and the exemption from personal liability for debts, etc., beyond the stock owned.

A charter is a valuable franchise frequently bought and sold. College charters have been thus bartered, but the claim that these institutions have rights and privileges so sacred and inviolable that the state which granted the charter transcends its constitutional power when it finds that society needs guards and fences for the protection of health, is most arrant nonsense. Courts after courts have piled up decisions which render impregnable the rights of the state under its broad police powers. My impression is that it may be stated as a fact that only those laws in this class have been declared unconstitutional which were either retroactive or which made unwarrantable distinctions between "persons of like age, sex, or condition."

It would seem that the old aphorism of Solomon might be changed to read, "Of the making of dental colleges there is no end." They spring up on every hand, mushroom-like, in a night. If we are to believe the professional magazine of Chicago (*Dental Review*, June, 1890, page 433), the chartered dental colleges in that city alone number between one and two score. Can any sane man believe that there is a field there for a half-score or more than a quarter-score? Are educational progress, the best interests of the profession, and the health and comfort of the people enhanced or retarded by such scattering of energies and such competition? Can we explain this great number on any other hypothesis than that some or many of them have for their basis such principles, aims, and methods as are common and honorable in business life, but should be uncommon and are dishonorable in educational matters? If states have general laws by which such institutions can be organized *ad libitum*, and men can be found to avail themselves of such laws, and the graduates of such institutions are ground out like wheat from the Minneapolis mills, by machinery, and branded and labeled as pure and unadulterated, what protection has society in one of the most important and essential principles of health, unless the state steps in as with scarlet fever, diphtheria, leprosy, pollution of water-supplies and drainage, pleuro-pneumonia, etc., to stay the tide which would otherwise spread waste, decay, mutilation, and destruction among the people?

Will anyone claim that public opinion is sufficient to deter the owner of an infected herd from selling his death-dealing milk and his poisonous beef? Has it not been found necessary in all states, under their police powers, to enact laws so that the infected herd shall be inspected,—that is, examined by a competent board appointed for the purpose, the sick segregated and exterminated, the exposed quarantined for a sufficient time, and thus the health of the people protected from danger?

Will public opinion be sufficient in a matter in which, by the very nature of things, discrimination and segregation are impossible except by the expert? or must that public opinion, to be effectual, be crystallized into enactments by the state which shall deal with this great question of health as has been done so generally with cattle? Is one wise and constitutional and the other unwise and unconstitutional? Will anyone maintain that because the owner of the slaughtered animals is reimbursed by the state, the case is different? This objection does not hold, for the only remedy in one case for the incurable disease is extermination, while in the other the disease is curable by longer study and more thorough clinical drilling, and the incompetent is simply enjoined till he secures the requisite knowledge and skill. The protection of the people from disease and injury is the same in each case; the necessity, the justice, and the power of the state to constitutionally guard the people the same. The older dental laws made this discrimination between the colleges, directing the boards to accept diplomas only from colleges which, after investigation, were found to be reputable; while most of the later laws, recognizing the difficulty of this method from the multiplicity of colleges, require that each graduate shall be subjected to an individual test.

Some harsh criticism has been made of the composition of state boards. I am not personally familiar with the boards of all the states, but so far as I am cognizant of them I should characterize the following extract from the remarks made last August by an able and distinguished friend as unquestionably untrue and slanderous. On page 95 of the Transactions of the American Dental Association, 1890, you will read:

> "I would not give two bits for any dental diploma from any dental college in the United States if it only allows me the privilege of going before a dental examining board and being examined, in all probability by men who had never seen the inside of a dental college, or a medical college either, and who are as innocent of a knowledge of the great fundamental principles which underlie the science of medicine as ignorance well can be; who have been appointed to office rather on account of political preferment than scientific attainment. These are facts. I am not guessing at anything. Political preferment, instead of scientific attainment, gets them upon the examining board."

A possible explanation of my friend's jaundiced view of this matter may be found in the fact of his environment, which he graphically states in the same speech as follows:

> "Coming as I do from the grand dumping-ground of the United States, where all the dental garbage of the world is thrown upon us, where no law can be enacted that is originally gotten by any man who puts on a clean shirt twice a week, I realize the real condition of things."

I have quoted these remarks not to give my distinguished friend an invidious prominence, but as a sample of what has been heard far too frequently and flippantly. That there may be a foundation for such statements is undoubtedly true, but as a whole the statement is false. I say, without any fear of contradiction, that with few individual exceptions the members of the state boards represent patriotism and professional devotion more than any other like number of dentists in the country. However appointed and by whatever influences, particularly in states where the examination of all is peremptory, they sacrifice more with less return than is the case with any of the extra office workers for professional progress. None can honor the honest and conscientious college instructor more than I. I know his labors and his responsibilities, and how poorly paid he generally is; but his pecuniary loss is much less than the examiner's, and his compensation in various ways infinitely more.,

Examining is tiresome drudgery, instructing is pleasant and stimulating; one is a treadmill, the other a race-course.

Is there any counterpart for the examiner to those lines of Thomson so often quoted?

> "Delightful task! to rear the tender thought,
> To teach the young idea how to shoot;
> To pour the fresh instruction o'er the mind,
> To breathe the enlivening spirit, and to fix
> The generous purpose in the glowing breast."

As an illustration of the injustice of this slander, it is a fact that in my own state every member of the board as originally appointed was a graduate, and the same is true to-day.

And to further show how "political preferment instead of scientific attainment" obtains in Massachusetts, notwithstanding petitions with many signatures were presented to the governor to appoint others, he very wisely has just reappointed for three years the two members whose commissions, after four years' service, were expiring. Allow me to quote from a recent letter of mine to our governor on this subject:

> "In every profession the proportion of those who have the judgment and knowledge to make competent examiners is small, and this small percentage is very materially reduced by the fact that a good part of those competent are unwilling to incur the extra labor and responsibility and the loss of income from what is practically a gratuitous service. It seems to me that when men have for years thus contributed largely of their means to the state, have proved their fitness and fidelity, and have added to their usefulness by experience, are willing to continue this generous labor, a recognition of these facts by reappointment is the highest exhibition of civil-service reform."

A rather amusing evidence of want of accurate knowledge occurred last summer. The National Association of Dental Examiners directed "the secretary to call the attention of the American Dental Association to the fact that a case involving the constitutionality of the New Hampshire dental law is now pending in the United States Supreme Court.'' A letter reciting the ''facts'' was sent, which is printed in full on page 30 of the Transactions of the American Dental Association. This communication was referred to an able committee of three, who reported that a committee of five should be appointed with power ''to engage counsel or associate counsel to assist in the proper prosecution of the case before the Supreme Court; and that this committee be authorized in their discretion to draw on the treasurer of this association for an amount not to exceed five hundred dollars.'' The report was adopted and a committee appointed.

It is rather singular that no one of the well-informed men of these two associations should have been aware that they were passing resolutions in which the one essential point was not true. The simple fact is that the United States Supreme Court has never had before it in any shape or form the question of the New Hampshire law. The dentists of New Hampshire accepted the decision of their own Supreme Court as final, and, like sensible men, instead of wasting their means by an appeal to the United States Supreme Court, set about securing the enactment of a law which was wise, just, and constitutional.

If the gentlemen who passed these votes had been better read, they would have known that the law about which they were so solicitous was not worthy of their care and thought; for in the COSMOS of February, 1890, page 92, they would have found the following:

> ''*Ex post facto* laws have been universally declared unconstitutional. The recent decision in New Hampshire declaring its medical and dental laws unconstitutional was summed up in the following words: 'The constitutional objection to the statute is that it imposes the burden of a license fee upon certain persons and exempts others of the same class and profession under similar circumstances and conditions.' The objectionable clause is contained in Section 8, which declares that 'the provisions of the preceding sections shall not apply to persons who have resided and practiced their profession in the town or city of their present residence all the time since January 1, 1875.' The law came into force January 1, 1879.''

I did not quote the full decision of Judge Clark, of New Hampshire, but only and very briefly the essential point. The old New Hampshire law made an unjust, frivolous, and ridiculous distinction between men of the same class. The distinction was that a dentist who had resided and practiced his profession in the town or city of his residence January 1, 1879, for all the four years preceding its enactment could retain his right to practice; but another man who, although he may have been in reputable practice in the state for fifty years, had moved either his residence or place of business within the four previous years; lost all his rights. It will be seen that this was a retroactive law in its most objectionable form, and deserved to go by the board.

We examined last July a graduate who claimed to have taken three full courses, the average of whose marking by the five examiners in his practical demonstration was 20 on a scale of 100, and in his theoretical examination showed such ignorance that the total average of both practical and theoretical was twelve per cent. Our examination was kindly and patiently conducted, with a view to call out the evidence that he had the requisite knowledge and skill. He came in December for a second examination, and after spending over two hours in an attempt to adjust the rubber-dam, in a simple case, for the filling of a crown cavity in a superior first molar, gave it up and went home without taking the examination in theory. We are ready to examine him again as often as he cares to come, and trust that he may by further study and application become proficient, but the serious fact remains that his disappointment and the blighting of his professional life are greatly aggravated by the failure of the college, which had opportunities far superior to ours to thoroughly know his capabilities, to retain him in the position of student till he had the knowledge and skill which his diploma says he has, or by a more honest dealing with him let him know, if such may be the truth, that he has not the peculiar talents requisite for an educated dentist. We have to deal with the products of the colleges, and are not concerned with their management, success, or failure ; but the graduating of this man, and some others whom we have examined, by one of the most popular dental colleges, suggests some serious questioning. An institution having a reputation which attracts students in large numbers from far and near, with the means which would naturally result from years of prosperity to supply itself with an ample corps of skilled lecturers and clinical teachers, should have such a regard for its position as a leading college and for its alumni who have contributed to give to it prominence, should so manage its course of instruction and the granting of degrees, that its diploma would have a relative rank among the diplomas of all colleges commensurate with its popularity.

I trust it is not the fact, but I am sorry to have to say that recent events seem to give the impression that one of the colleges which has succeeded in keeping its classes small by a most earnest and faithful adherence to a comparatively high standard has caught the itching for popularity and larger classes.

On the whole, I am justified, I think, in making the pleasant announcement that the general average of the examinations the past year has been higher than in former years. May we not hope that the trust is not vain that this is an evidence of more thorough training and greater discrimination in graduating?

That there should be uniformity in state laws is certainly desirable, but the question of how to bring it about presents grave and serious difficulties. National education and the establishment of another and superior degree have been suggested, but these, I think, would bring in new elements to embarrass and retard the evolutionary process which is fast working out the problem.

A large part of the annual address of President Foster to the American Dental Association last summer was devoted to this subject, and he discussed it in a calm, fair, and thoughtful manner. All will agree to his statement that "it is perfectly obvious that we are dealing here with a subject of much importance, and upon which a great diversity of opinion exists. The rights and best interests of the public, our profession, the colleges, and the newly graduated students, are all involved."

This part of his address was referred to Section II, who reported to the association the following resolution, which was adopted :

> "*Resolved,* That the American Dental Association now in session appoint a committee of five, whose duty it shall be to report to the body, at its next annual meeting, some plan by which the unification of the state dental laws may be accomplished, as recommended in the address of the president, and for the consideration of other subjects therein embraced."

The following committee was appointed : Drs. A. H. Thompson, J. Y. Crawford, C. N. Peirce, H. B. Noble, and W. W. Walker.

I congratulate the profession that this important subject is thus officially placed in such able hands, and I now purpose, in discussing this topic, not to anticipate their work and judgment, but to present to them as well as to the profession my mite of contribution to aid them in reaching a conclusion which shall be fair and just to all concerned.

President Foster, from what he called a "hasty examination and rough analysis of our state statutes," remarks that we have laws of four classes :

"1. Which demands that both graduates and non-graduates shall be examined by state boards before admission to practice.

"2. Recognizing the diplomas of reputable schools. These permit the holder to practice, to the exclusion of all others desiring this knowledge.

"3. Demanding examinations, but allowing this favor to graduates only.

"4. Demanding examinations of dentists whether graduates or not, with exceptional clauses in favor of the medical degree."

I fail to find included in the above four classes another law which has been common, which might be added to his list, and may be denominated Class 5 :

5. Recognizing the diplomas of reputable schools, but requiring examination of non-graduates with conditions generally of years of study or previous practice to be eligible to examination.

A deliberate examination and thorough analysis will demonstrate, I think, that the newer laws are generally of Class 1, requiring examination of both graduates and non-graduates, as in Massachusetts, Maine, New Hampshire, Tennessee, etc.

That in states where the laws are or were of Classes 2, 3, and 5 the laws were passed years ago, and in a number of states have been replaced recently by laws of Class 1, as shown in Minnesota, Mississippi, New Jersey, etc. An effort is now making to change the Illinois law so that it will correspond with Class 1.

These movements in so many states illustrate the evolutionary process.

The chief argument against diverse state laws and separate and independent registration in each state is that the free emigration from state to state is thereby hindered or obstructed. Under the form of law where the diploma admits to practice, this objection vanishes ; and under the form where every person has to submit to examination it ceases to be a hindrance to removal in exact proportion as the individual is qualified, and acts only as prohibition upon those who are unqualified. While it undoubtedly works hardships upon the latter class, confining their itinerancy to the single state of their primitive residence, it may be claimed that hardship to the few is the penalty of all processes for advancement, social, moral, and legal ; and further, if this class cannot get a living in their original residence, and so are forced out of practice, the great end of the proscriptive law is thereby the sooner achieved. The fact remains that the great and constantly-increasing proportion of the qualified are not hindered in removal, for they should be in reality, as in theory, able to pass the examination of any state board, and should be willing to contribute this small amount of cost and trouble to the sum of general good.

The National Association of Dental Examiners some years ago formulated a law which it recommended as a pattern, thus early recognizing the importance of the uniformity of the laws of the various states. The pattern of that day would hardly meet with approbation now, so great has been the change of sentiment resulting from experience and study of the subject. Again, at its meeting last summer, this association appointed an able committee consisting of Drs. Jack, Gordon, and P. T. Smith, "for the purpose of formulating desirable features of a dental law to be recommended for inclusion in the laws of the various states." This committee in reporting said, "We understand the purpose of the above resolution to be an endeavor to secure as far as possible a state of uniformity in the laws of the different states, with the view that as new laws may be made and old ones amended, at length the above stated condition of uniformity may be attained." The report of the committee after amendment was adopted, and has been published in the dental journals. It presents some good features and some which are objectionable. I will only notice briefly the latter.

Section No. 3 reads,—

> "That five years' continuous practice at the time of passage of the law shall qualify for the continuance in practice."

The wisdom of the legislature of Massachusetts is nowhere more conspicuous than in the provision that every person who was in the practice of dentistry on the day the law was passed should, in the simplest and most inexpensive manner, be continued in the right he then possessed, whether he had possessed that right one day or fifty years, was a competent and educated man, or the greatest bungler and charlatan. The law was not in the least retroactive, nor was there the slightest distinction made between men of the same class. In this respect it is impregnable, and has not been inveighed against, except by the unreasonable. The result has followed that death and removal are fast thinning out the ignorant and unskilled, and their places are being filled and the total enlarged by the educated and skillful.

With the exception of a very few, who were granted licenses to practice previous to my former address, the one hundred and eighteen men whom we have examined were passed as "worthy and well qualified." How many ignorant and unskilled non-graduates and graduates have been kept out of the state by our wise and beneficent law can only be conjectured.

I regard it as of the highest importance, both for justice and constitutionally, that in the enactment of a law to regulate any occupation which before had been free and untrammeled, there should be such a recognition of the *status quo* that the humblest should be left undisturbed in the possession of a right which, up to the time of the passage of the law, no one had questioned.

Recent enactments in several states, like the laws in Maine and New Hampshire just passed, and in other states, have this principle in words so nearly like the Massachusetts law that we may almost claim that uniformity in this respect is already secured.

No. 4 reads,—

> "That said boards shall have power to conduct examinations and grant certificates to those not graduates, providing the candidates present satisfactory certificates or affidavit of having had at least five calendar years of instruction."

And No. 6 reads,—

> "We believe that the boards should have power to examine graduates of dentistry."

There are two main criticisms of these sections.

One is that the phraseology, "shall have power," implies a permission and not an obligation. There are arguments in favor of an option on the part of examining boards to examine or not, as in their judgment may be necessary, but the arguments against this option are far stronger, the principal one being that all are placed upon the same footing in being obliged to undergo an examination.

By the phraseology of nearly all recent laws, the scope and thoroughness of the examination are left to the discretion of the board, two conditions being mandatory: one the examination, the other that the successful candidate shall "possess the requisite qualifications."

The second criticism is upon the limitation of the examination of non-graduates to those who have "had at least five calendar years of instruction."

While many earnest and honest friends of education have advocated that colleges should grant degrees upon examination, irrespective of length of study or where and how the knowledge was obtained, they have been met by the objection that the college was essentially designed for educating and not for graduating, and that there might be danger that the practice in the hands of some colleges would degenerate into the selling of degrees. On the contrary, the state examining board is in no sense an educational body. Like a jury, it sifts the evidence and decides the case upon its merits as then and there presented to it. It should receive all, from whatever quarter, and by the best means at its disposal ascertain present facts.

The fifth section reads,—

> "These, and all examinations, shall be both oral and written, and the candidate shall also be subjected to tests of practical skill."

Section 9 reads,—

> "That failure to fulfill the requirements in any one branch should be sufficient to disqualify a candidate to receive a certificate of capacity."

The chief criticism of the above sections is that they aim to have embodied in a general statute minute details which have no place there, but should be left, as they have been in most general laws, to be determined and formulated by the specially educated experts, who from the nature of things should have some discretion, and would be likely to be better authors and judges of the details than the legislature.

I will not take time to examine here the requirements specified in these sections, except to express the opinion that in some respects they are unwise and unjust, as judged by my conception of the intent of laws for regulating dental practice. In my view, every other question for the consideration of the state board is subsidiary to the one question which the state has delegated to it, and that is whether the candidate possesses the "requisite knowledge and skill in dentistry and dental surgery" to turn loose upon the community with a proper regard for its best interests. While it would be proper for the educating institution to withhold its certificate from the student until he was fully educated in *all* branches there taught, it would be unwise, unfair, and unjust for the state under its police powers to deny the license to practice to a skillful, wise, and judicious man who had failed to "fulfill the requirements of any one branch."

I cannot better illustrate my position and that of the Massachusetts board than by quoting the following extract from a communication which was sent to every registered dentist in Massachusetts: "The board has decided that the foundation of the 'requisite qualifications' shall be, in the future, practical skill. A brilliant theoretical examination will not be satisfactory, under any circumstances, if the candidate is deficient in skill; while positive skill as an operator might, under certain circumstances, make up for deficiency in theory."

Section 5 states that "all examinations shall be both oral and written." I should give my unreserved approval of the written examination of the student by the college. The professor who has given the lectures knows what questions to ask and how to frame them, and the student who has listened should clearly understand the full scope and meaning of the questions.

But the case is otherwise with the state examiner. He has to modify the form of his questions in accordance with the manner in which the candidate has been taught, if he would have them correctly apprehended. To get at what a stranger knows, it may be necessary for him, in a sense, to feel his way along, and vary the question until it is understood. We have had in one examination old practitioners who have never attended a college, and graduates from six different colleges. Some candidates have shown such proficiency that a dozen questions asked by each examiner and fully and correctly answered in five minutes left no doubt of their knowledge, while I gave to the graduate of whom I spoke a while ago twenty-five minutes, and the ground was all trodden over in a vain attempt to find some spot with which he was familiar.

There are many other reasons which I might state in favor of an oral examination. I believe it is a minor detail which can safely be left to the board.

The twelfth section reads,—

"The state boards should have power to revoke for cause a certificate of qualification."

I suppose "certificate of qualification" here is intended to mean "license to practice." Without taking time to discuss this proposition, I will simply say that I consider it unwise and dangerous in many ways.

President Foster asks, "Does not this forced examination of our college graduates show to the whole world an implied distrust and want of confidence in our own schools? Even foreign countries recognize some of our college degrees. Under the laws above quoted none are recognized. Is not this a national degradation? And is it not calculated in every way to injure and destroy our own institutions?"

When we can read printed in plain type in the year of grace 1890 certain proceedings of the National Association of Dental Faculties, held in the same town and at the same time as was the meeting of the American Dental Association at which the above words were uttered, the inference might be drawn that there are colleges and colleges, that "distrust and want of confidence" is more than implied, and that things are done "calculated to injure and destroy our own institutions." These proceedings are but samples of many acts and scenes which the National Association of Dental Faculties has witnessed, if we can credit reports which have leaked out as well as have been published, so great is the competition among the colleges for students and increased income, and so difficult is it to keep the refractory within bounds.

In the last report of the Section on Education to the American Dental Association occurs the following (page 54):

> "In view of the fact that a very large proportion of our dental schools are dependent upon the class in attendance for support, and that the compensation to professors and demonstrators has a like sustenance, the temptation is constantly to increase the class beyond capacity for instruction, and to estimate its value by numbers rather than quality. To such an extent has this been true in the desire to excel by publishing a large graduating class, that a prominent school some two or three years since graduated the same five students two successive years. To express the condition of our educational institutions tersely and in few words, we should say that under the present organization of a very large majority of our schools the tendency or temptation is to insufficiency rather than proficiency, to superficiality rather than solidity."

To show where we are to look for reform the same report says,—

> "That this step shall be maintained, so that the profession may reap the benefit of this united and progressive action [referring to the three years' graded courses] depends largely upon the state boards of dental examiners.
>
> "The state examining boards are the only power capable of correcting this malfeasance, and unless they are willing to exercise this power the resolutions proclaiming this advance in educational institutions are but blots upon their books, and as worthless as a discarded garment."

Legal enactments for years have been gradually tending to the evolution of the college as a school pure and simple for education and training. The progress in this direction since the Massachusetts law was passed four years ago has been most marvelous.

Minnesota, Mississippi, New Jersey, Maine, New Hampshire, Tennessee, and I know not how many others have joined forces with us to bring about this desirable consummation.

When this seemingly impending day shall have arrived, we shall find that facility in graduating will cease to operate to crowd the halls, and instead the breadth and thoroughness of teaching, and the abundant equipment of the infirmary, with experienced and skillful demonstrators, will be the test of comparison ; and as in nature, so with the colleges, there will be worked out the survival of the fittest.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(This series of papers will include a description of the various cavities commonly found, together with comprehensive directions for overcoming the obstacles which frequently interfere with successfully filling them ; also, a consideration of rare and difficult cavities, and the special methods essential to their treatment.)

Now that the dentist is no longer to be denominated the "knight of the forceps," it is fundamentally essential that he who would become a conscientious practitioner should be able to determine whether a tooth be salvable by the insertion of a filling ; to decide which of the many materials now in use will best attain the end in view ; to properly prepare the cavity for the reception and continued retention of the filling, and be capable of scientifically and skillfully placing it so that it will be as nearly perfect as the attending conditions will permit. This much has been accomplished by a goodly number of the dentists of the past and present. Something more will be expected of the dentist of the future. He will be asked to abandon the assertion, "Madam, your tooth has decayed around my filling, *but the filling was all right.*"

Undoubtedly there are teeth in which it may be impossible to prevent recurrence of decay, but it is equally true that in too many cases when the "tooth decays around the filling" the filling was *not* "all right." It is opportune, therefore, to discuss these questions more in detail than has been done heretofore.

Those whose fillings are frequently returned to them in a leaky condition are compelled to adopt one of two propositions : Either their work is inefficient, or else the teeth upon which they have operated are of poor quality. It is but human to lean toward the latter

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explanation. The position, however, is rarely tenable. The argument used is this: "If the tooth decayed when it was perfect, why should it not do so after it has been filled? I cannot be expected to build better than did the Creator." This sentiment was loudly applauded at a national meeting, leaving the impression upon the mind of him who analyzed the situation that there were many present anxious to adopt this specious excuse for the failures which had attended their efforts. The fallacy lies in this: While it is perhaps true that no material exerts any therapeutic influence beyond the mere mechanical stopping of a hole and restoration of contour, it is also true that, given a tooth, and certain conditions under which it is attacked by caries, the caries will occur invariably at a specified situation. Therefore, when the cavity is filled scientifically the tooth is safer than ever, because the vulnerable point is now occupied by a material which will resist destruction by caries. If decay occurs along margins, it is because those margins were improperly made either as to shape or position, or else because the filling was unskillfully inserted or finished. An ideally completed filling is one which is given as high a polish as the material used will permit. Those who argue for "dull finish," because less conspicuous, forget that "high polish" means smoothness, which quality is a prerequisite.

The student watching his preceptor is almost invariably impressed with the idea that only a few principles are involved, and that the operation of filling a tooth is purely mechanical. As soon as he acquires the knack of packing gold and producing a polished surface afterward, he considers that "he knows it all." It is only after several years of bitter experience at refilling teeth for his own patients, that he begins to suspect that perhaps there is more in this branch of dentistry than his mind had grasped. Let us now consider the subject in detail, from the point of view that there is more involved in it than mere mechanics.

General Principles involved in the Preparation of Cavities.

Removal of Decay.—When a cavity has been properly prepared, the tooth is half filled. The most beautifully polished, solid, well-formed filling will fail if the cavity has not been skillfully shaped.

To the mind of the layman it would seem idle to discuss the propriety of leaving any decay in a cavity. It is not uncommon to have a mother say, "Doctor, please be sure to take all the decay out, as I don't want Willie's tooth to trouble him again." To her mind, safety lies in thorough cleansing. It seems a rational proposition, yet it has been argued by high authorities that there are frequently occurring cases where it is best not to remove all the decayed dentine.

This is a grave error. With rare exceptions it is imperative that every trace of caries should be obliterated. The tooth about to receive a filling should be as wholly healthy as it can be made.

It has been claimed that decay covering a pulp may be left in place and sterilized with safety and advantage. This sterilizing is usually done at the sitting at which the filling is placed. I have followed this advice in a few cases, where, in the front of the mouth, it seemed best to take every precaution to avoid destruction of the pulps and consequent discoloration. In every case I have afterward removed the fillings, because of a bluish appearance which subsequently presented, showing that despite the fact that the edges were yet perfect, decay was progressing internally. This shows that a perfect gold filling will not stop decay if carious dentine is left in the cavity. Recent reports from Professor Miller are in harmony with this experience, since he shows that the germicides upon which most reliance has been placed are ineffectual unless left in a cavity much longer and in greater quantity than has been our practice. When our chemists shall have discovered for us a sterilizing agent the use of which will assure us of a discontinuance of carious action, *in already carious dentine*, then, and not till then, will there be any argument worth listening to against the assertion that *it is malpractice to fill over decay*.

There is, however, a delicate distinction to be made between dentine which is carious, and that which may be slightly affected because of its juxtaposition with caries. As fast as caries advances, the dentine suffers alteration. This action is physiological, and is nature's method of defense against the inroads of the enemy. A retrogressive metamorphosis occurs. The lime-salts are partly dissolved out, the dentine returning toward an embryonal condition. If the progress of the disease be slow, a redeposition of lime-salts occurs, the new tubuli being built up of a form better able to resist caries. Where this is successful, we observe that condition which we term "arrested decay." The surface is brownish in color, and flinty; the tooth is safe: nature has cured the disease. We may therefore cut down to a stratum of dentine which is undergoing this change, which is easily cut, but not, strictly speaking, decayed. It is highly important in these cases not to excavate deeply enough to expose the pulp. The operator must have the knowledge to enable him to determine when to stop. The experienced practitioner recognizes the condition by sight and touch, but a definite description may serve to guide others.

The softening of non-carious dentine occurs most frequently in those teeth from which we remove carious dentine in leathery layers. To excavate such a cavity, use spoon excavators only. Never employ a hatchet, or a hoe, or an engine-bur, unless needed for shaping after the decay has been removed. With a spoon begin at a point farthest away from the pulp, and gently lift the outer edge of a layer. Having thus disengaged it, proceed to lift it around its whole circumference, and then work gradually toward the center till it can be taken out of the cavity. Repeat this as often as a layer can be started at its circumference. As soon as the last distinct layer has been removed, scrape all the walls vigorously, removing even the softened dentine which may be clinging to them. The cavity will now be clean, but the bottom of it will be soft. Still using the spoon, scrape the bottom very gently, starting at the circumference and approaching the center, removing all small particles which may be thus disengaged, without actually cutting. A reliable germicide should now be used on cotton, the cavity sealed with a phosphate cement, and so left for two or three days, when the filling may be inserted with safety.

Non-carious dentine may be found beneath other than leathery decay. If the carious portion is brown, or black, the demarcation is discoverable by the color, softened dentine being usually of nearly normal color. When it is found underlying decalcified enamel, the enamel will come away as a white, chalky powder, and the dentine beneath need only be removed as required for the retention of the filling. This condition is rarely observed except under "green-stain," and the destruction is a decalcification, rather than true caries. A corundum stone should be used to remove the stain, when the decalcified enamel will readily be distinguished by its white color. The dentine beneath is non-carious, but as the destruction is superficial there is little risk of exposing the pulp, for which reason no special caution is needed beyond the usual care when operating on healthy dentine, not to cut deeper than is actually necessary to correctly shape the cavity. It may be said in passing that this decalcification of enamel due to or accompanying "green-stain" is usually associated with highly sensitive dentine. This is fair presumptive evidence that the dentine is undergoing a change which by loss of lime-salts leaves a disproportionately large amount of soft tissue. In this particular class of cases the sensitiveness may usually be controlled sufficiently by hot-air blasts to allow rapid preparation of the cavity with sharp engine-burs.

Retentive shaping.—The cavity cleansed of decay, the next important object is to so shape it that the filling cannot be dislodged mechanically after it has been inserted. To accomplish this sometimes taxes the utmost ingenuity of the most experienced, so that binding rules cannot be formulated to cover all conditions. It will therefore be best, in order to describe methods covering a wide field, to take up individually the more common cavities, but before proceeding to that discussion we shall present here a few general principles.

The great desideratum is to so form the cavity that the visible external surface of the filling, when placed, shall have a smaller diameter than some portion which is within the cavity. We should thus have a mass occupying a cavity whose orifice would not permit the passage of its greatest diameter. Such a filling could not be removed mechanically, except in pieces. If the material therefore were durable, the filling would be permanent as long as the opening was not enlarged by decay or fracture. There are, however, other considerations which may make it imprudent, or impossible, to follow this rule, as, for example, when such a course would cause the excavation to approach the pulp too nearly. Dentistry is in many respects governed by mechanical laws, but when we come to apply mechanics to living tissues there are frequently points at which the ordinary laws must be set aside and reason allowed to hold sway. In the case of the retention of a filling, reason would set aside one law, however, only to adopt another, which, though not so general in its significance, would be indicated in a special instance. Where it becomes unwise to attempt to enlarge a cavity till its orifice is its smallest diameter, there are usually at least two directions in which extension may be made, which will sufficiently serve to hold a solid filling. Much may be gained at times by judicious roughening of the surface of the cavity. Fig. 1 exemplifies such a case.

FIG. 1.

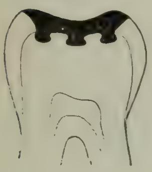


FIG. 2.

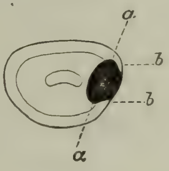


FIG. 3.

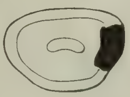
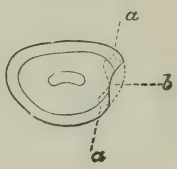


FIG. 4.



The crown of a molar has become denuded of enamel, and the dentine is highly sensitive. A few dovetails made with a sharp rose bur will serve to retain a filling, though the orifice has the largest diameter. Again, there may arise cases where the destruction leaves, not a cavity proper with an orifice, but merely a loss of substance with no retentive shape whatever. It is in these cases that the ingenuity of the dentist is taxed. In many instances well-placed screws are of great advantage. These will be described later.

In the simpler forms of cavities, those which may be described as having surrounding walls and orifices, the rule first mentioned must usually be applied, but judgment must be employed. These cavities are of three classes, approximal, crown, and surface, the latter including palatal, labial, lingual, and festoon cavities.

We shall consider approximal cavities first, because they are the most difficult, and demand more skill and judgment. Fig. 2 is a cross-section through an incisor which has been filled. A casual glance demonstates the fact that the filling could not be dislodged, because the greatest diameter, which is in the line *a*, *a*, is larger than the opening, *b*, *b*. The cavity, however, though mechanically correct, is made without due consideration of the fact that living tissue is being operated upon. If after the removal of decay the cavity naturally assumes this shape, it is permissible to fill it without further alteration; but whenever possible, it should be formed as in Fig. 3, which, while equally retentive, leaves a greater amount of dentine between the gold and the pulp. This method should be adopted in all so-called "saucer-shaped" cavities (Fig. 4), which may be deepened by grooving at *a*, *a*, the point *b* being left untouched.

In Fig. 5 we observe a form, which, though correct in its relation to the pulp, and formed upon mechanical principles, is nevertheless unskillfully made. It would be improper for one to make such deep undercuts intentionally, and where they have been produced by caries the orifice must be enlarged by chipping away the weak enamel, as indicated by the dotted lines *a*, *a*. Many fillings have failed through the well-meant but unwise efforts of the operator to give great retentive strength to his cavity by deep undercuts. Undercutting to a slight extent is imperative, but beyond that all deepening is a source of weakness. In placing gold in a cavity formed as in Fig. 5, the force used to pack the gold into the deep undercuts, whether with hand-pressure or the mallet, would tend to strain the wall outward, probably resulting in a crack, which, escaping the eye of the dentist, would yet ultimately result in the loss of a piece of enamel along the edge of the cavity. This would be more likely to occur along the palatal border, *b*, because the palatal undercut would be more accessible during the filling-operation. Thus an imperfection would be produced at a point out of sight, and the patient would be unconscious of the mishap until caries had supervened. Then we should hear our dentist say, "My filling is all right, but your tooth has decayed around it." The deep undercut at the labial aspect *c* would probably be not fully filled because of its inaccessibility, especially where the separation was but slight. Fig. 6 makes this plain. The gold does not quite reach the wall at *a*. It has been well proved that the most expert dentist cannot fill a tooth with gold so tightly that an aniline solution cannot stain the walls of a cavity. Therefore it is readily seen that as soon

FIG. 5.

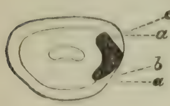


FIG. 6.

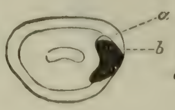


FIG. 7.

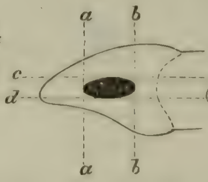
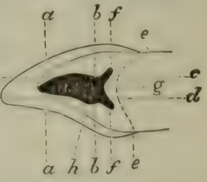


FIG. 8.



as the fluids of the mouth pass the slight barrier at *b* and reach such a space as that shown at *a*, we have a most favorable condition for the recurrence of caries; which explains the occurrence of the mysterious bluish color which occasionally is seen around an apparently perfect filling. If it is denied that a filling cannot be made water-tight, it is still to be remembered that in filling this labial undercut, even thus imperfectly, the strain as in the case of the palatal aspect would probably crack the thin enamel. The subsequent loss of even a tiny particle of enamel would give sufficient entrance for fluids into this artificially-produced lacuna. If, in addition to this, the excavation had not been thorough and just a little caries were left, it would require no gray-beard to explain the blueness.

In Fig. 7 we have an approximal surface occupied by a filling which thus indicates the outlines of the orifice of the cavity. Fig. 8 is placed in juxtaposition, and lines are drawn through the two for comparison. The latter is a longitudinal section through the greatest diameter of the filling, the approximal portion having been thus removed. By comparing the lines *a*, *a* in the two figures, it is seen that the undercut toward the cutting-edge is very slight. Any great extension in this direction is not only unnecessary but endangers the corner of the tooth, already weakened by decay. Comparing the lines *b*, *b*, it is seen that this portion of the cavity is extended much beyond the border. Also observe that this extension takes the form of horns, conforming in shape with the imaginary line *e*, *e*, which represents the gingival border of the enamel. By proceeding thus it is plain that we leave the enamel at the gingival border of equal strength, whereas if with a rose bur we cut a groove connecting the horns *f*, *f*, we gain nothing in retentive strength, while by thus undermining the enamel unequally we leave it weak at *g*. In malleting gold against this border the greatest strain will be against the weakest point, *g*, because of unequal resistance, probably producing a crack or fracture, which readily explains in one way the oft-noticed recurrence of caries at the gingival borders. By comparing the lines *c*, *c*, the labial borders, it is seen that a slight extension, or groove, exists along the full extent, decreasing toward the cutting-edge. The lines *d*, *d*, however, indicate that the lingual borders are identical, except at *h*, where there is a decided dip. Along the lingual portion of an approximal cavity (in the six anterior teeth) it is usually safer to make no groove except at the upper third, where the thickening of the tooth gives sufficient dentine for a deep dip, which will add great retentiveness to the cavity. Fig. 9 is important. It is a section through an incisor and filling, the labial half being removed. At a glance it is seen that on this plane the cavity has no retentive shape whatever. This is because on this plane, which is through the center of the pulp, extensive undercutting would either approach the pulp, or produce weak points in enamel. The gingival border at *g* is seen to be strong, and shaped to resist any necessary force which may be brought against it. Were the cavity shaped as seen in Fig. 10, we should have *g*, a weak point, as shown in Fig. 8, where we view the same thing from another aspect. Extension toward the cutting-edge as shown in this figure would make possible a fracture in the direction of *a*, which would result in the loss of the corner.

FIG. 9.

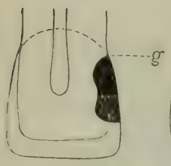


FIG. 10.

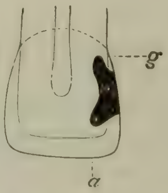


FIG. 11.

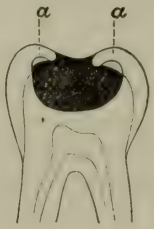
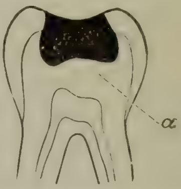


FIG. 12.



Until we take up special cavities in detail, it is not necessary to say more of approximal cavities, there being only a few points in connection with the incisor region which do not apply to bicuspids and molars, and *vice versa*.

In the preparation of what are strictly crown cavities there is little to be said here beyond emphasizing the necessity already pointed out, not to leave too great undercuts. If the cavity be left as in Fig. 11 after the removal of decay, an attempt to insert gold would probably result as figured, spaces occurring at *a*, *a*. Subsequent mastication would crush the weak enamel, and leaky borders would ensue. Fig. 12 shows how such a cavity should be formed, the dentine being left as thick as possible (*a*) over the pulp.

FIG. 13.

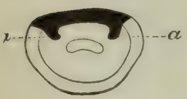


FIG. 14.

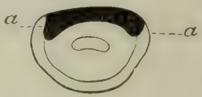


FIG. 15.

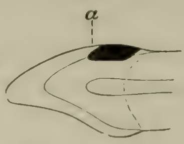
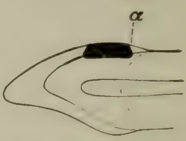


FIG. 16.



The consideration of compound cavities, involving crown and approximal surfaces, may be better discussed when we come to special cases.

Festoon cavities are those which, of all surface cavities, require most thought. Fig. 13 is a section through an incisor and filling. Grooves for retention have been made at points *a*, *a*, equidistant between the central line and the approximal surfaces. These being directed toward the pulp, or straight downward where the pulp is closely approached, offer counterbalancing resistance and are all-sufficient, especially because the position is one where there will be little, if any, mechanical force exerted to dislodge the filling. In this form of cavity we obtain strong edges, whereas if shaped as in Fig. 14 the edges are weak (*a*, *a*) and liable to fracture during the process of filling. This would especially be the case where an approximal cavity either existed or should afterward occur. In forming such an undercut it is very probable that the other cavity would be reached, and thus the enamel separating the two would be very fragile.

In Figs. 15 and 16 we have longitudinal sections, the approximal surfaces being removed. Fig. 15 shows a groove or undercut (*a*) toward the cutting-edge, but none toward the gingiva. This latter arrangement furnishes a solid surface against which to mallet gold, while the one groove, terminating in the horns pictured in Fig. 13, is all-sufficient for retention. Where a second groove is made toward the gingiva, as in Fig. 16, the enamel or border at *a* is weak, and recurrence of decay more probable.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, May 12, 1891, in the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. Norman W. Kingsley, in the chair.

Dr. F. A. Roy, chairman of the Clinic Committee, read the following

CLINIC REPORT.

The regular monthly clinic was held this afternoon at the new depot of The S. S. White Dental Manufacturing Company, in the Lincoln Building, Fourteenth street and Union Square. Between seventy-five and eighty dentists were present.

Dr. R. G. Stanbrough, of New York, prepared a root with his special instruments and showed completed crowns. The instruments are for preparing the root and for adapting the crown accurately to it. It is hoped to have the crowns manufactured in suitable forms and placed on sale. A case was shown of four incisors crowned a year or more ago which are now in perfect condition. Dr. Stanbrough will give a detailed description at a later date. . . . Dr. Z. T. Sailer, of New York, demonstrated the use of a napkin-holder for the lower jaw. It consists of a chin-piece and arm, or bar, to hold a napkin over the ducts. The chin-plate is open so that it will adjust itself better to the chin. The bar can be delicately adjusted by the thumb and finger without danger of too much pressure, and is fixed by a thumb-screw. The bar swivels on a common center on chin-piece and mouth-piece, enabling it to swing out of the way. The mouth-piece is adjustable to the depths of different jaws. . . . Dr. S. L. Goldsmith showed a removable bridge supplying the left lower first and second molars attached to crowns on the third molar and second bicuspid, sliding in place on Van Woert gibs, the porcelain faces also being attached and removable by Van Woert gibs. The gibs are prepared with the aid of special pliers, by means of which the dovetail slots are formed. The bridge comes in contact with the gum from tooth to tooth, thus avoiding any self-cleansing or unclean space. . . . Dr. C. Sill, of New York, demonstrated a method of using oxyphosphate of zinc for the purpose of obviating any irritant action by mixing one part of petrolatum with eleven parts of oxide of zinc, and then combining with the liquid made somewhat thinner than usual. Thus prepared it seemed to make a very hard filling. . . . Dr. F. H. Lee, of Auburn, N. Y., showed models and demonstrated his manner of repairing rubber plates, making regulating plates with their appliances attached and small partial plates without waxing up and flasking, by applying the rubber directly to the model, thus saving the work and avoiding the danger of changes in packing. The model is first dried, then painted with a solution of rubber in chloroform. The rubber is then pasted or rubbed on with a hot spatula, as in the process of "waxing up." If teeth are used, they are to be warmed and pressed in place and held until cold. The work is then invested in plaster with or without a flask. If without a flask, the vulcanizer and plaster must be allowed to cool before opening. . . . Dr. W. S. Elliott exhibited a sand-paper disk-carrier, with a folding mandrel head. The disk is clamped by a slide and a pivoted jam-clutch and rubber washer. It has no screw or spring, and no separate parts. It is simple and quickly manipulated. . . . Dr. Thomas Moore, of Paterson, N. J., presented a patient with the alveolar process all absorbed and upper gums hypertrophied, who has had much trouble wearing plates. She has worn plates for thirty years—full plates for eighteen years—with many changes; all red rubber. Evidently each plate was different and not too well fitted, causing new irritation at each change. A number of dentists examined the case, and advised rest for a few weeks without plates, and the use of salicylic acid or other wash, afterward the insertion of carefully-fitted plates of black rubber or metal. . . . Dr. C. B. Baker, of Bridgeport, showed a practical way of sealing chloride of ethyl tubes by means of a suitable large rubber band, holding over the opening in the point a few thicknesses of rubber-dam.

. . . A request was made by your committee for cases of copper amalgam fillings of over two years' standing, but only one was shown. We have had a great deal of adverse opinion as to copper amalgam. Dr. C. E. Kells, Jr., of New Orleans, who was an early user of copper amalgam in a careful, watchful manner, writes that even when handled with the utmost care many fillings which have not formed a protecting oxide disintegrate, and even some black fillings wash out. The committee had hoped to obtain a decided expression of opinion from those who claim such good results, so that we might be helped to decide upon the proper place for copper amalgam which it may have in relation to alloy-amalgams and the plastics. A copper spoon or mortar was shown in which copper amalgam could be heated and triturated while warm, obtaining greatest plasticity with the least heating. . . . A local anesthetic was to have been shown, but the owner, who had promised to give Dr. Gottschaldt the composition, wrote that he "would be more than pleased to furnish them his formula for a consideration." . . . The Fraser Tablet Triturate Manufacturing Company, of New York, kindly sent for distribution samples of antiseptic pastilles convenient for spray, mouth-wash, etc. This is a non-secret preparation, the formula of Dr. Seiler's prescription being on the bottle. They were gotten up in a very elegant manner, and have been found exceedingly convenient, avoiding the annoyance of keeping liquids on hand, especially in traveling.

[At the annual meeting of the society held April 14, announcement of the death of Dr. Atkinson was made as follows :

Dr. Dwinelle. It is my melancholy duty to announce the death of our well-beloved friend, brother, tutor, and teacher, Dr. Atkinson, which occurred April 2, under very sad circumstances, for it seems that his son's death had only transpired a short time before. I rise for the purpose of asking that a committee be appointed to draft and present to this body proper resolutions in reference to his death. Dr. Atkinson, as we all know, was a man of peculiar character. We shall miss his genial presence and his characteristic and loving salutations, and in the bitterness of our grief we may exclaim with Tennyson,—

"Oh for the touch of a vanished hand,
And the sound of a voice that is still!"

Dr. Rhein. In rising to second the resolution proposed by Dr. Dwinelle, I would say that it is to me, gentlemen, the most painful occasion that has occurred since I entered the practice of dentistry. It is now seventeen years since I first made the acquaintance of Dr. William H. Atkinson, and from the first day I knew him until the last moment I had the pleasure of seeing him I always found him in every sense of the word a brother. It was often my pleasure and privilege to go to him for advice. It made no difference what condition he was in,—how much pressed by his own work,—he was always ready to aid me with the best counsel at his command. While at times his flights of rhetoric were often such that we could not follow, we were always able to gather from him those crumbs of wisdom which will remain with us as long as we live, and I hope that the committee appointed will prepare resolutions that will be a permanent recognition by this society of the esteem which we feel for our deceased brother.

Drs. Dwinelle, Perry, and Rhein were appointed a committee under the motion.]

Dr. Dwinelle. Mr. President, your committee appointed at the last meeting of this society to prepare resolutions of respect to the memory of Dr. Atkinson report the following:

WHEREAS, In the demise of Dr. William H. Atkinson this society has met with an irreparable loss, one which marks an unusual epoch in its history; therefore,

Resolved, That the sad and unexpected departure of our friend and brother has so taken us by surprise that we are unable to find words fitting for the occasion.

Dr. Atkinson, as we all know, was one of the founders of this society, which in a large sense through his continued devotion and practical ministrations has been brought to its present pre-eminence. He had special relations to our society. He was regarded as our leader, our teacher, and our prophet; he has been called a "teacher of teachers," and in a degree we have indorsed him as such, so that while he has regarded our society as his "pet" in which his best hopes were centered, we, at the same time, have acknowledged his *fatherly* relation toward us together with the benefits of all his teachings. So persistent was he, and so magnetic his presence, so forcible his intellectuality, that at times he would obtain the conviction and co-operation of those adverse to him, all of which, together with his teachings and efforts in general, have conspired to the building up and establishing the common cause for which we all are laboring.

He was in advance of his age, and hence sometimes misunderstood, ridiculed, and subjected to derision. He might be classed with those reformers who are often regarded by many as fanatical, but it has been said, "The fanaticism of the beginning of a century often at the end becomes conservatism." He lived long enough to have many of his skeptics accept and adopt his most advanced thoughts, some of whom may yet see the day when they will proudly boast that they knew him personally, that he had taken them by the hand, that they had been the subject of his peculiar, genial nature, and the recipients of his rare teachings.

His genial, loving nature and generous hospitality, which was sometimes abused, were prominent traits of character that all will recognize. His impulsiveness sometimes led him to make mistakes, but he was sincere in his regrets and quick to make amends.

His contributions to the literature of our profession have become to a certain degree standard, and his doctrines accepted as authority. Among his more prominent articles which will be perused with special interest are those on Histology and Microscopy, Necrosis, Inflammation, Ripening and Ripeness, and his later one on the Origin of Pus, with many others.

His language, which at times was unfamiliar to many, may yet prove to be the vocabulary of the gods, or, as he expressed it, "the angels." This justifies the expression that has often fallen from our lips, "He spake like one inspired!"

It is a matter of congratulation to many of us that we have lived to be so much in accord with what may have seemed at the time to be the veriest vagaries, but which we now accept as the highest truth.

Rather than regard him as a man of eccentricities, let us say he was a man of the most marked individuality; he was *Atkinson* to the *uttermost*, and no other! As Emerson was *Emersonian* in his life and character, so Atkinson was eminently *Atkinsonian* in everything he did. So intense were his convictions and so earnest his desire for the establishment of the highest truth, that he frequently seemed severe, and even personal, which was farthest from his intent. He only considered the seeming obstacles that lay in his way, and pressed forward to its attainment, his motto being "Principles, not men!"

While he did not accumulate the riches of the world, he gained what is better,—wisdom,—and the fruit of it he bestowed liberally upon all with whom he was associated. In this sense his life was an eminent success, and his memory will endure.

Dr. Atkinson's life was one of active work, chiefly in new fields of labor, where he gained eminence and added to the world's progress. This is our heritage, the legacy he has left for our keeping and our remembrance. How best can we perpetuate that life and memory that his work may go on?

Resolved, That we, your committee, be authorized to procure a suitable bust or portrait of Dr. Atkinson to adorn the meeting-room of this society; and furthermore be it

Resolved, That a committee be appointed to co-operate with other societies in establishing a more enduring memorial to our departed friend.

Resolved, That while bowing to the Divine wisdom which has removed from us our dear brother in the midst of his activity and usefulness, and while deploring our own great loss, we do, in the name of our society which he cherished so much, extend to his surviving family our most sincere condolence and sympathy.

W. H. Dwinelle,
S. G. Perry,
M. L. Rhein,
Committee.

The report of the committee was accepted and ordered spread upon the minutes of the society.

In response to a communication from the Central Dental Association of Northern New Jersey, Drs. John I. Hart and M. L. Rhein were appointed a committee of two to co-operate with like committees from other societies, and form a Memorial Committee, who shall be empowered to call upon the whole world for a generous response, to the end that a suitable memorial be erected to the memory of Dr. William H. Atkinson.

The President. There is a matter which is intimately connected with this general subject which I would like to bring before you. Most of you know that only three months since we gathered together all the dentists who were able to come who had been in practice fifty years or more, and paid them the honor of a dinner. We found only about forty living, and less than half of those could come. Out of that forty, three have died since February 1,—in fact, since April 1 : one, Dr. Atkinson, of whom we have been speaking ; another, Dr. Fuller, of Peekskill ; and last of all to name, but not in importance, Dr. Maynard, of Washington.

Although Dr. Maynard was not a member of this society, he was nevertheless a member of something that is a great deal larger than this society, and something that should be just as dear, if not dearer to us : he was a most eminent member of the dental profession, and it is eminently proper that for a man of his distinguished traits of character, skill, and ability we should take some fitting notice of his death.

Remarks eulogistic of Dr. Maynard's life, character, and work were made by Drs. G. A. Mills, S. G. Perry, and W. H. Dwinelle ; whereupon the president appointed Drs. Perry, Dwinelle, and Hodson a committee to prepare suitable resolutions upon the death of Dr. Maynard, in accordance with the resolution to that effect offered by Dr. Perry.

Adjourned. B. C. NASH, D.D.S., *Secretary.*

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE twenty-third annual meeting of the Dental Society of the State of New York was held at Albany, N. Y., on May 13 and 14, 1891. The sessions were held in the lecture-room of the Young Men's Christian Association.

The meeting was called to order at 10 A.M. on Wednesday, May 13, by Dr. W. W. Walker, of New York, president of the society.

After the transaction of routine business, Dr. E. C. Kirk, of Philadelphia, read the following paper on

THE DENTAL USES OF ARISTOL.

The compound known as aristol, discovered in the laboratory of the Farbenfabriken at Elberfeld, Germany, was introduced to the notice of the medical profession by Dr. P. J. Eichhoff, dermatologist to the city hospital of Elberfeld, who recommended it as a substitute for iodoform in the treatment of certain cutaneous diseases. Its chemical composition suggested the possibility that it might "replace iodoform in its action and be without the disagreeable properties of the latter, especially its intense characteristic and at times tell-tale odor, and above all its poisonous properties.''

The elaborate clinical studies of Eichhoff and many eminent specialists who have investigated the therapeusis of this drug in their several departments have furnished us with a concensus of opinion not only as to its value as a substitute for iodoform, but have developed the fact that ''it has in addition an action peculiar to itself, which may be explained as depending upon the chemical and pharmacodynamic action of its individual components and their mutual action in the compound.'' A glance at its chemical structure and physical properties will help to an understanding of its therapeutic action. If an aqueous solution of iodine in potassium iodide is poured into an alkaline solution of thymol, a reddish-brown precipitate, the iodine derivative of thymol, is thrown down, which precipitate collected on a filter, washed and dried, constitutes the compound in question, the aristol of commerce, or, chemically speaking, dithymol biniodide. It is a light, amorphous, non-crystallizable powder, and from its chemical deportment it is supposed that in its production the hydrogen atom of the hydroxyl group of thymol has been replaced by iodine ; that is, an iodoxyl compound is formed by the substitution of an iodine atom for the hydrogen atom of the hydroxyl group. It is non-poisonous, non irritant, wholly devoid of unpleasant odor, and is insoluble in water, alcohol, and glycerin, but soluble in chloroform, ether, oleic acid, and fatty and essential oils. That the iodine and thymol are but loosely held in combination is evident from the comparative readiness with which decomposition of the compound with liberation of iodine occurs under certain circumstances. For this reason all solutions of aristol should be made without the aid of heat, and, as suggested by Dr. Langgaard, it should not be prescribed in conjunction with starch, caustic, alkalies, or substances which possess a powerful affinity for iodine, such as ammonia, metallic oxides, mercuric chloride, etc. The unstable nature of the compound is perhaps the key to much of its therapeutic value, probably affording by its decomposition in the presence of purulent secretions, etc., a means for the presentation of iodine in the nascent state, in which condition its well-known antiseptic and germicidal properties are most active, a consideration of much value and entirely apart from the therapeutic value which undoubtedly belongs to aristol itself. It is more active than iodoform along the same lines, though containing proportionately less iodine, but the greater unstability of the aristol combination renders its iodine more readily available than the iodine of iodoform, in which compound the union is stronger and the compound less readily decomposable. It is not intended that the foregoing suggestion shall be taken as an explanation of the entire question of the therapeutic action of aristol, as this is undoubtedly modified in general by the individual action of its other component, thymol, and it would seem reasonable to suppose that the combination of both substances should, in cases where no decomposition takes place, exert an action peculiar to and dependent upon properties belonging to the compound *per se.*

The non-poisonous and non-irritant qualities, together with the antiseptic property claimed for aristol, first induced me to investigate it with a view to testing its value as a medicament in dental therapeusis, and the exceedingly gratifying nature of the results so far obtained with it have induced me to bring them to your attention at this time.

My first use of the drug was in the treatment of a typical case of pyorrhea alveolaris, in which the disease was advanced to a point which led the patient to apply for the removal of several teeth which were exceedingly loose, the absorption of the alveoli of the two lower central incisors having progressed to an extent which seemed beyond all hope of repair. The tissues surrounding these teeth were exceedingly tender and painful, due to an acute exacerbation of the inflammatory process, a condition which is frequently noticed during the progress of this disease. There was the usual abundant discharge of pus from the pockets about the necks of the teeth. Examination with the probe revealed the characteristic dark-colored calcareous deposit upon the roots, which, in a number of instances, extended nearly to their apices. All attempts to remove the deposit were rendered futile at this sitting by reason of the extreme soreness of the tissues. As a preliminary treatment, therefore, an application of aristol was made as follows: A ten per cent. solution approximately, of aristol in oil of cinnamon was made by rubbing the drug up with the oil on a glass plate by means of a spatula, and with this solution threads twisted from a wisp of absorbent cotton and cut into half-inch lengths were saturated, and gently carried by means of a blunt probe to the bottom of each suppurating pocket, the effort being made at the same time to encircle the root at the base of the pocket with the medicated thread. After each diseased alveolus had been so treated, the case was dismissed for twenty-four hours. The result shown at the next sitting upon the following day was as gratifying as it was surprising, for all inflammation of an acute type had subsided, there was an entire absence of fetor, the flow of pus had entirely ceased, and the soreness had so completely vanished that thorough removal of the calcareous deposits was undertaken and carried out at this sitting as far as the limits of time would allow. An application of aristol in cinnamon oil, as in the first instance, constituted the final dressing, and no other medicament was used during the treatment, with the exception of aromatic sulphuric acid, which was applied after the mechanical treatment by scalers, for its solvent action upon any small granules of tartar which escaped the action of the instrument. The case was treated weekly for about ten weeks, and the improvement which took place at first has gone on steadily. There has been no recurrence of the flow of pus or of inflammatory action except in two instances where, upon careful examination, a small nodule of tartar which had been overlooked was discovered upon the surface of the root. A repetition of the treatment described served to at once relieve the inflammatory action.

The case is now without treatment, save the use, several times daily, of a wash consisting of ten grains of zinc chloride to the ounce of peppermint-water. The teeth are still somewhat loose, but are sufficiently firm for comfortable use in mastication, and are undoubtedly becoming more rigid as the process of repair goes on, while the entire gum-margin presents a perfectly healthy appearance, and there is no evidence whatever of any active inflammatory process.

I have gone somewhat into detail in the report of this case, inasmuch as it represents the most satisfactory result I have so far been able to secure in the treatment of this obstinate condition when undertaken at the advanced stage described, and because the application of the same line of treatment has yielded like good results in the majority of similar cases in my charge.

As the use of cinnamon oil as a vehicle may be objectionable to some patients, on account of its odor, it may be found desirable to use instead the oil of gaultheria, as suggested by Dr. Louis Jack, who finds it more acceptable to the majority of his patients, and he secures equally satisfactory results with it.

The use of a solution of aristol in essential oils as a medicament for canal-dressings and as a topical dressing in acute pulpitis naturally suggests itself. A somewhat extended use of it in these classes of cases leads me to the following conclusions: That as a root-canal dressing its use should be strictly confined to those cases where pericemental inflammation is not a present factor, for the reason that it does not seem to possess antiseptic qualities of a sufficiently active character to enable it to overcome quickly the septic conditions due to putrefactive changes which are to be met in the canals of teeth. Such conditions demand the application of more active disinfectants and antiseptics; but when a thorough aseptic condition has been attained, an aristol root-dressing for preventing reinfection from without, and as a sedative root-dressing under a probationary filling, is in the highest degree satisfactory. My experience, therefore, leads me to limit its use as a root-dressing to the class of cases cited, and those immediately following extirpation of the pulp before the possibility of infection has occurred.

As an antiseptic in conjunction with permanent root-fillings, I have found it extremely valuable in connection with gutta-percha, as follows: a ten per cent., or even stronger solution, if desired, of aristol in chloroform, in which it is freely soluble in all proportions, has dissolved in it sufficient gutta-percha to render the liquid of a creamy consistence. This may be used in the same manner and under the same conditions in those cases where chloro-percha is found to be useful. Or in large canals where gutta-percha cones can be used with accuracy the cone may be dipped in the solution of aristol in chloroform and at once carried to position, the superficial solvent action of the chloroform upon the cone greatly aiding the process, while we at the same time have the satisfaction of maintaining complete asepsis of the canal by means of the aristol upon the surface of the root-filling which is in contact with the canal-walls.

I have made use of aristol in connection with root-filling materials by another method, which so far has yielded satisfactory results, but the cases are too limited and insufficient time has elapsed to enable me to report fully upon the value of the method. A strong solution of aristol is made in the oil known to house-painters as "Japan dryer," sufficient of the drug being added to make the liquid somewhat thinner than glycerin. Into this is worked with a spatula freshly calcined oxide of zinc until the mass is like putty, in which condition it is to be worked into the root-canal. In the course of a few days the mass becomes quite hard, and seems to fulfill admirably the requirements of a root-filling. I have used it principally in the canals and pulp-chambers of deciduous teeth, with entire satisfaction so far. The use of this combination for a root-filling was suggested by the composition of the well-known cement of red lead and boiled linseed oil used by gas-fitters for making gas-tight joints in iron pipes.

In the use of carbolized cosmoline on cotton as a permanent root-filling, it would seem that the replacement of the carbolic acid by aristol would be an advantage which might help to mitigate to some extent the nastiness of the method as now practiced. As an application for the relief of pain in acute pulpitis, either the chloroform or cinnamon oil solution gives in most cases immediate and satisfactory results.

My experience with it as an ingredient of nerve-paste for devitalizing purposes places it about on a par in value with iodoform for the same use, with the one advantage that it is free from disagreeable odor; but neither of these is up to the standard of a devitalizing preparation with which I have been experimenting lately and shall publish in the near future.

Not the least interesting and altogether satisfactory application of aristol in dental practice is the use of its chloroform solution instead of sandarac varnish for saturating cotton used for wedges or temporary stoppings in retaining medicaments during treatment. A pledget of cotton saturated with aristol dissolved in chloroform, upon evaporation of the solvent, has its fibers held together by the peculiar resinous character of the aristol, in which condition the pledget perfectly fulfills the physical requirements of a cotton and sandarac wedge, but with the special advantage that it is entirely antiseptic, which in this instance means more than might at once appear. Such a dressing or wedge may be retained in the mouth for days or a full week, and when removed is entirely free from offensive odor, while the peculiar fetor which arises from a similar application of cotton and sandarac is a constant drawback to its use, sufficient to bring about its disuse by many operators because of the annoyance to themselves and their patients. The antiseptic nature of the aristol dressing is markedly shown in its effect upon the gum-tissue in those cases where approximal caries has extended beyond the gum-margin, and when hypertrophy of the gum festoon occurs to the extent of causing a polypoid growth which extends into the cavities, sometimes completely filling them, as is frequently seen in caries of the sixth-year molars of children. In such cases it is not even necessary to extirpate the growth by operation,—an advantage in the case of a nervous patient,—but simply to pack firmly into the cavity and approximal space an aristol and cotton dressing, and dismiss the case for several days, when upon removal of the dressing it will be found to be entirely devoid of offensive odor; the fetor characteristic of such cases will be gone, and the gum-margins will present a normal healthy appearance with the cavity fully exposed to view. To increase the adhesiveness of the aristol solution, a small quantity of Canada balsam may be added; this I have not found necessary for its use in connection with cotton dressings, but it has some slight advantage when used for coating paper or asbestos felt for pulp-capping, or as a varnish for lining cavities in connection with gutta-percha filling, in both of which applications it answers a valuable purpose. As a pulp-capping varnish, a solution of aristol in collodion may be used, but the chloroform solution made as thick as syrup, flowed over paper and applied over the point of exposure, and the solvent evaporated by a current of warm air, has been more satisfactory to me than the collodion solution of aristol used in the same manner.

The indications here given are merely intended as suggestions for the use of this drug by those who may feel interested to experiment further in developing its possibilities. My own experience with it makes me commend it unhesitatingly, feeling assured that it possesses a unique combination of chemical, physical, and therapeutic properties which must, as it becomes more widely known, win for it a permanent and increasingly useful place in the catalogue of our therapeutic agents.

Discussion.

Dr. C. N. Peirce said he could not do less than confirm the statements made by Dr. Kirk regarding the efficacy of aristol. About a year ago his attention was drawn to this agent by Dr. Kirk in an inquiry from him as to what remedy he was using for pyorrhea and root-dressing. In response he told Dr. Kirk that he had for some time been using with satisfactory results a dressing composed of oil of cloves, oil of cinnamon, tincture of iodine, and carbolic acid,—equal parts of each, with sufficient iodoform added to make a creamy paste; the iodoform in this combination being rendered entirely odorless. Dr. Kirk at that time suggested the use of aristol with oil of cinnamon, which suggestion was immediately put into practice, and the preparation has since then been in daily use, not only by himself, but by others in his house who are equally favorable to it as a dressing, for its antiseptic influence.

In opening into confined cavities of decay where an unpleasant odor is so frequently perceptible, an application of aristol in connection with oil of cinnamon on a pledget of cotton promptly removes the offense, and the conditions are changed from septic to aseptic, so that not only is the result very satisfactory, but in the application itself there is a marked absence of anything disagreeable.

Dr. Peirce during his remarks exhibited a bottle of "thymol-iodide," prepared by Bullock & Crenshaw, which is identical with aristol; this latter term being a protected name given it by the originators of the article, and as such sold for $1.80 an ounce, while the former can be procured for $1.25. In its application to severe cases of pyorrhea the response has been very prompt. In its preparation for this purpose place upon a glass or marble slab the liquid to be used, oil of cinnamon or gaultheria, then with a spatula rub into it the aristol until a smooth, creamy paste is obtained; this with a flattened broach is readily carried into the pockets, or in contact with the inflamed surfaces to be treated. Its influence upon irritable gum-tissue is apparent within twenty-four hours, acting both as an antiseptic and an antiphlogistic.

A member. How far have you used it in these cases? How often have you to apply it?

Dr. Peirce. I would see the patient at least twice a week, at first; then once a week, then once a month or once in six weeks. I would have no hesitation in using it every day if I deemed it necessary.

Dr. W. C. Barrett. The chemical composition of a compound is no indication of its therapeutic value. Aristol is a combination of iodine and thymol, but without the therapeutic action of either the one or the other. As a germicide it is not at all to be compared with other remedies with which all are familiar. He had not used it very long, because it is patented and has not been long before the profession. There are some objections to it. In the first place, it is not soluble in water, and very sparingly soluble in alcohol. It is soluble in ether, which is the form in which he has commonly used it. He has also used it with oil of cloves. When he desired to obtain effects which would naturally be expected from aristol, he had generally found that he could obtain them better with other things, yet he believed it a valuable addition to our pharmacopœia.

He had seen good effects from its use in pyorrhea, but better from other remedies. If there are septic pockets, he obliterates them and usually finds it necessary to remove the edges of the alveolar process, after which he preferred something more stimulating, and therefore uses a solution of chloride of zinc, at the same time keeping them aseptic. He has used for this purpose mercuric chloride, or permanganate of potassium. He has experimented with nearly all the known preparations, and has come back for this purpose to the old remedies. He thinks aristol should be in the case of every dentist, but experience has taught him to warn people not to expect too much from it. The solution in oil of cinnamon is probably preferable to that which he has used. In cases in which there are indurated products of inflammation he had obtained better results from the pure tincture of iodine. He does not thrust it into a pocket reeking with pus, but first disinfects with peroxide of hydrogen. He does not apply the tincture of iodine in every case, but in the specific cases in which it is indicated—in sub-acute inflammation of the pericementum, for instance—aristol will not supply its place. It is not to be compared with the mercuric chloride as a germicide ; as a disinfectant, it does not pretend to enter the list with the peroxide of hydrogen ; but in the cases where it is applicable it is very useful and a very pleasant preparation, as it has not the odor that is connected with iodoform.

Dr. Peirce wished to add to what he had said, that if there is a pocket it should be washed out first with the peroxide of hydrogen and placed in a perfect condition before the aristol is used. The remedy should be protected from light and air when not in use, as it loses its strength by exposure.

Dr. S. H. Guilford had not had much experience with aristol. It is a new remedy which has been taken up by the medical profession very generally. They claim to have obtained the best results by its use, but it has become a "fad" with them, and he questioned whether it is not going to become a fad in our profession. He thinks very much as Dr. Barrett does about it ; he cannot feel so enthusiastic as Drs. Kirk and Peirce do, for he remembered that in the past we have had remedies brought to our notice which were lauded to the skies, were used for a time with wonderful results, and then fell into disuse.

Aristol has certain properties to commend it, especially its lack of odor, but sometimes we gain an advantage in the color or lack of odor, and lose in efficiency. Iodoform has been decried on account of its disagreeable odor ; this has been remedied, but it is not so effective as when not deodorized.

When aristol is placed in contact with the tissues it is practically insoluble, and we want a medium to carry it to its place. Iodoform works also in the same way ; we use a medium to carry it and then let the tissues take care of it.

For use on external tissues it is probably a good thing. He had never used it as Dr. Kirk has, but he can imagine its fitness there, because he knows it is about as effective as iodoform and is free from disagreeable odor ; but he could not help expressing, as he had many times in the past, his implicit faith in iodoform. The only thing urged against it is its odor. This is a serious objection to its external use, but not to its use inside of a tooth. He had early discovered that a few drops of oil of cinnamon would remove the odor of iodoform, and it has no undesirable effect in the cavity. In cases of chronic suppuration, where all other remedies have failed, he had used this iodoform solution successfully. It had been his stand-by.

Dr. B. T. Wiggins said he had used aristol for nine months, having been led to employ it in place of iodoform, as a root-dressing and in the treatment of abscesses. Although his method is somewhat different from that described, he had had good results. He had generally used it mixed with olive oil to a paste ; also in ethereal solution. He has also successfully used iodoform and zinc oxide in paste.

Dr. Kirk said he would like to call attention to a misapprehension of Dr. Barrett. The paper said distinctly that he limited the use of aristol to cases where putrefactive changes were not going on. He approved of Dr. Barrett's use of iodine in such cases. Dr. Barrett spoke of the decomposibility of aristol as being a drawback ; the speaker claimed this as its most important quality. We may draw an analogy from his favorite peroxide of hydrogen, which is one of the most unstable of compounds and depends solely for its activity upon its great unstability. By its decomposition we have oxygen liberated in the nascent state, upon which the value of hydrogen peroxide depends. The chemical composition of a compound is, to a certain extent and in many cases, an indication of its therapeutic value, as for example the similar therapeutic action of the alkaline bromides. Dr. Guilford fears the use of aristol may become a fad ; but that is no reason why we should not investigate it. His objections to the use of aristol were interesting, because he states he has not used it very much. The question of odor is important, in relation to iodoform and all drugs used in dentistry.

Dr. Barrett replied that he did not mean to refer to therapeutic disintegration, but to spontaneous decomposition.

At the evening session Dr. L. D. Shepard, of Boston, Mass., read a paper on "Education and Legislation," which will be found on page 543 of the current number.

Discussion.

The president, Dr. Walker. Dr. Peirce will open the discussion of Dr. Shepard's paper.

Dr. Peirce said he was on record as being thoroughly in favor of examining boards. The paper of Dr. Shepard clearly stated the issues. As a teacher of thirty years' standing, he could say that no one accepted with greater satisfaction than he the action of examining boards. From his earliest connection with schools as a teacher, he realized the great effort it required to withstand the temptation to grant degrees which had not been fully earned. It is one of the most difficult positions to fill without bias. The only complete remedy is that the degree shall not be conferred by the teacher, but by a board entirely independent of the source from which the education was obtained. The duty of the board is the protection of the public. The duty of the teacher is to guard well the efficiency of the school. Both are creatures of the state, but to the board especially should the commonwealth look for protection from empiricism, and the value of the degree bearing the seal of the state. For this reason he was in favor of examining boards whose function shall be to designate those who shall practice dentistry in said commonwealth or state.

There had been many suggestions made to him during the last year as to the position he should take, to harmonize the feeling existing between the schools and the examining boards. The dean of the Baltimore College said we ought to insist that whenever a diploma has the indorsement of the examining board in the state, that diploma should be good throughout the United States. Now, the only way that can be brought about would be for the examining boards of each state to form a national board, and for such national board to indorse the diploma ; then it would be good throughout the United States.

It has been claimed that equity requires every faculty to examine a student at any period of study, and, if qualified, to let him go forth as a practitioner. That is not the province of the faculty, but of the examining board. The student presents himself, and the board can say if he is or is not qualified ; and if he is, he can practice. The faculty cannot do that, they are assailed by too many temptations to be allowed that privilege ; it is a power that should be awarded only to an examining board.

He felt that he should be cautious in speech, for being closely allied with one school, whatever he said might be considered as showing some antipathy to some rival school; but he stood there simply as a teacher, and as such was decidedly in favor of the degrees being granted independently of the teachers, and thought that until we can arrive at that state we shall not be free from an undesirable class of practitioners.

Dr. Barrett. This subject has come to be a momentous one; it influences the whole question of the proper education of those who are to become members of the dental profession. In all educational departments there have been objections to faculties graduating their students. The difficulty is attributable to the fact that the faculty which is the educating body has a pecuniary as well as professional interest in the graduates, and in graduating the largest number of students. He had held for some time that no teaching faculty should be allowed to confer its own diploma. It is urged that they know best what are the qualifications of those who come up as candidates for graduation; but if an examining board is not competent to discover the qualifications of candidates, the appointment of such a board is a farce. New York has passed a law, which has become active, to the effect that the right to grant medical diplomas shall be vested in a board independent of the teaching faculties, and appointed by the state authorities; in other words, that the sole business of the college is to teach the student, and if a student is refused graduation by the examining board it is an indication that he has not passed through the proper curriculum, or that the members of the faculty are incompetent and unqualified for their positions.

The board must be made up of men competent for the work, who have passed through a curriculum of study that has made them familiar with the examinations of medical students. They are independent of everything, and simply grant a diploma to those who are competent.

It seems utterly unjust to grant a diploma upon a mere examination. The specious plea that knowledge should be recognized wherever and however obtained has been the cloak under which fraudulent diplomas have in all cases been issued. The business of the teacher is to teach, and not to distribute honors. It should be demanded that the student should have passed a proper course of study and spent a sufficient period of time to obtain proper knowledge before he comes before such a board.

The boards in the different states are working at cross-purposes instead of laboring together upon a harmonious line; the board in one state disqualifying those who have passed an examination before the board of another state. When each state shall have a competent body to examine candidates for practice as well as for graduation, that board alone should have the power to grant diplomas. If the boards in the different states confer degrees under the same general law, it will be possible to have uniformity in examinations by the different boards, who are entirely independent of the schools, and there will be respect by one board for the opinion of another.

Last year he had attended a meeting of the British Dental Association, at Exeter. The situation in Great Britain is very different from that in this country. Here we have nearly fifty different states, each of them maintaining its autonomy and legislating for itself; granting charters to colleges under varying conditions and with no central body which can pass a law binding throughout the country. In Great Britain all that is necessary is for Parliament to pass a law which is general for the realm. This subject was debated for two days by the ablest men in England. There was the same desire there as here to reach the highest possible point in the methods of granting degrees by educational institutions. The same difficulty arose there. The question was as to having a higher degree than that of Licentiate of Dental Surgery. The concensus of opinion at the end was, that it was unnecessary to have another degree; that if the degree of L.D.S. was not sufficient, the standard should be raised.

He did not agree with Dr. Shepard that there are too many dental colleges; compared with the number of students, we have not near the number needed. A student often has to go hundreds of miles before he can reach a place where he can be properly educated. When the granting of degrees is placed under proper restrictions we need not be afraid of an excessive multiplication of colleges.

In England the degree of Licentiate of Dental Surgery is granted upon examination, but it is being urged that it should be granted only after a due course of study and practice; that, however, rests not with a dental examining board, but with the medical council, in which dentists are represented. He was strongly and definitely in favor of an examining board, but wanted it to be one with extended powers; a board that shall have the confidence of the profession of the world, with power not only to license to practice but with the sole power to grant degrees after examination. Then, instead of trying to see who shall graduate the greatest number, the sole contention of the colleges will be to see that their students shall be able to obtain their degrees. The college that gives the best instruction for examination before such a board will get the most students, and thus secure the survival of the fittest.

The Dental Society of the State of New York some years ago obtained from the legislature the power to examine for a diploma. He thought that was a great mistake. It was simply complicating matters by multiplying the number of diplomas, and gaining nothing more, and the sooner the society retires from that position the sooner will it take the high ground which it ought to take.

Dr. E. T. Darby said he would be very glad to see a national board of examiners, whose duty it would be to examine the graduates of all the dental colleges, but it seems impracticable. No board could be found to undertake such a task. There are strong arguments against allowing a faculty to graduate its own students. He would gladly relegate that duty to a board of examiners, but how is such a board to be appointed? Who are competent to undertake such a task? When the state board in Pennsylvania was created, one of the provisions was that no one connected with a dental school should be a member of the board. At that time he was not connected with any dental college, but the year after he was elected to a professorship in one of the schools. Then the argument was that a professor in a dental school was the very man to examine, because he was accustomed to teach. He was retained on the board, and as vacancies occurred they were filled by the appointment of other college professors, because they were thought to be best qualified.

There was a feeling afterwards that the colleges should not represent more than half the board, so the board was composed of three from the dental colleges and three from the profession at large. He had witnessed the examination of a student at one time by a gentleman who could not answer the questions himself,—questions from a quiz book. It is an easy thing, it is said, for a man who knows a thing to tell it, but it is not easy for all men to tell it in the same way. A student comes before an examiner and gives the method which he has been taught. He is asked how to fill a root-canal, and answers, "I fill it with chloride of zinc, or gutta-percha." The examiner says he ought to fill it with iodoform or putty, and he "plucks" him because he did not know how to fill a root-canal.

He would gladly see created a board of examiners for the purpose of examining all students graduated from Maine to California, but how is such a board to be appointed?

Dr. Frank Abbott said that his mind had been very much disturbed over this question for many years. He had been teaching and examining men for over twenty-five years. Almost every day of his life he came in contact with students, and from the fact that it obliged him to examine them he was almost sorry that he was a teacher. He wished he might never have to examine another. Teaching is pleasant, as Dr. Shepard has said, but the examination is anything but pleasant; it is very disagreeable when one is obliged to say to a man, "My dear sir, what have you been doing the last two or three years to know so little as you do?" That same expression is frequently made to men who come up before faculties in dental schools.

He had taken quite a strong position against boards created by state laws for the examination of those who come into the state to practice, but he had recently changed his mind about that matter. State boards certainly have one merit, and that is, of sifting out the incompetent. If the question should come up in the state of New York to-day as to whether a board should examine all dentists desiring to practice in this state from the college with which he was connected or from any other source, he thought he should vote for it.

He had noticed in the reading of the paper the statement with regard to one of the men that was rejected,—that the ground was entirely gone over in twenty-five minutes.

Dr. Shepard (interrupting). That was in one chair only.

Dr. Abbott (resuming). Even so, twenty-five minutes is a very short time in which to find out what a man knows. Ten minutes might satisfy you that he knows, but to take twenty-five minutes only, and claim the ground was all gone over, in any one chair, in the practice of dentistry, seemed to him a rather short time. He could not do it, and he did not believe many other men could. It is a very difficult matter for one who is not teaching and has no knowledge of what is taught in the schools to question an applicant in accordance with what he has been taught.

He did not mean that one kind of anatomy is taught in one school and a different kind in another, or that different kinds of pathology are taught in different schools ; but certain methods of treatment are taught in one school and different methods in other schools, and the examiner should give a man a chance to make his own statement. As an instance, he said it was pretty well known that in his practice he differed very much from others. He uses rubber-dam probably only once in a thousand times, yet there are a great many men who say that a contour filling cannot be properly inserted without a rubber-dam, although some of the best fillings he had ever seen were put in before rubber-dam was thought of. His practice would probably be condemned by most examining boards, because most of them are composed of men who have gone into practice within the past twenty-five years.

The idea of a national board of examiners he thought could hardly be realized, but something ought to be done by which boards of examiners and the national association of faculties should work together in harmony. He thought a very wrong thing was done last summer in naming the schools the graduates of which had been rejected. It created a feeling that will make trouble if it is persisted in.

It is a fact well known to many teachers, that some students have ways of getting through their examinations that are mysterious. Some fifteen years ago there was a student in the New York college who was very ignorant and of low grade among his classmates. When his written answers came in they were wonderfully good. The faculty did not understand it, until some six months afterward it leaked out that he had a friend, a graduate of the school some years before, who was a very bright fellow. The friend was outside the door, and the student sat near the door and passed the question under the door to him, which was answered and passed back, and the applicant put it in as his answer. That was done without the knowledge of a single man connected with the college. He did not suppose any college faculty is infallible, but all are liable to let men through who are not perfectly qualified. He thought the time had come when there should be a board outside of those who teach which should determine the qualifications of applicants.

Dr. S. H. Guilford. The subject discussed by Dr. Shepard is not only a very interesting one, but it is a very broad one. Ever since dentistry amounted to anything at all in this country, the demand has been for advancement. In response to this demand colleges were organized. They filled their place in the beginning; were as good as the people then knew how to make them. After a while the demand for further advancement caused changes to be made. In the early days men were graduated after an attendance upon a course for five months each year for two years; and degrees were conferred upon men of well-known ability who had not attended lectures at all, for the reason that those men, whatever their qualifications may have been when they entered the profession, had made their mark in the world themselves and had proved themselves worthy to practice. After a while the profession said to the colleges, "This thing ought not to be; you have granted degrees to as many men as deserve it." The colleges abolished that plan. After that it was said that although men should not be graduated who had not attended lectures, there should be a distinction made in favor of men who had practiced a long while and acquired a part of their education outside of the colleges; and therefore many of the colleges agreed to accept a man who had been practicing for five years, and make that five years equivalent to one course of lectures. That continued for a while, and then the demands of the profession went further, and that plan was abolished. The colleges did as was recommended, and decreed that all students must study two full courses,—in some cases a spring and fall course being obligatory and in some conditional. Finally the demand came to be made in stronger terms, by virtue of the authority of the American Association of Faculties, that all colleges represented in that association should require a course of three full years. He thought this history showed that the men who have been engaged in dental teaching have responded in good faith to the demands of the profession. The number of those desiring to attend college is on the increase. Last year we had in Philadelphia nearly eight hundred students in the dental colleges alone. It has been urged that we should have fewer colleges. But how is this to be accomplished? It is an easy thing to procure a charter for a dental college. If a certain number of reputable men ask for the privilege, it is granted. The profession has demanded a restriction in the number of colleges, but the number of educational institutions cannot be restricted by legal enactment. What course, then, shall we pursue, so there shall be fewer students and fewer graduates? He thought it could only be by taking steps to shut out some of the colleges.

The medical profession have been following the same line of thought that we have, and it has culminated in the passage of laws regulating the practice of medicine.

He had not yet arrived at the belief that a state board of examiners is absolutely necessary to examine dental students, and thought that the time will come when a dental diploma shall mean everything it should mean. He thought that in all cases of theoretical examination by state boards the questions should be submitted in writing, and the questions and answers filed; then, when a college is suspected of graduating candidates unqualified to practice, the examination papers before the board would show whether the applicant was qualified to begin with. He knew of no institution in which a diploma is granted that requires a subsequent test. When a young man has studied law a definite length of time and applies for examination, a board of examiners decides as to his competency, and he is admitted to the bar. His certificate allows him to practice at once. The same rule is followed in the ministerial profession.

If it is necessary to have a state examining board, how shall it be constituted? How shall the examinations be carried on? Under the bill now before the legislature of Pennsylvania a student coming up for examination draws a numbered slip and registers that number. It is presented to the board. His name and residence and the institution from which he came are unknown. The questions and answers are in writing, and are open to public inspection for from three to six months afterwards, so if there is any doubt as to his being competent the record can be appealed to. All are treated alike; no distinction is made; no recognition of previous practice or reference to any school. The examining board renders its report and says whether the applicant has passed or failed, and only after that does it become known who the candidate was. If we are to have dental laws, he thought they should be framed upon that plan. As it is to-day, a student is graduated and stands well according to his professor. He comes before the board and is examined orally, and as he answers, the board marks him as it thinks best. Perhaps he is rejected, and the news comes back to the college. The faculty say, "It is very strange; the man passed his examinations." But there is no record kept, and nothing to refer to. Would it not be better to have the examination in writing, so that others might judge as to the fitness of the questions and answers?

As Dr. Barrett said, we are in a transition period. He believed all want to let as many good men into the profession as possible, and just as few incompetent ones; but he thought in the future the barriers would be placed at the entrance of the colleges.

In regard to a uniformity of state laws: One state has a law and an examining board; another state has no law. How can we get uniformity of state laws? Only by having a national examining board, says one. But every state has the inherent right to frame its own laws. The United States will not pass an enactment requiring the same law in all the states.

Dr. Shepard. In Massachusetts a graduate from the ordinary law school has no rights until he has been examined before the courts, and often graduates of those schools are not admitted. In New York it was formerly the case that a graduate of the Columbia Law School was admitted to practice on his diploma, but it is not so now. The graduate of that school has to pass the same examination as though he graduated from any other institute. In regard to ministers, everybody knows they are examined by a counsel or presbytery, but a man has to be ordained to the sacred office. He cannot be ordained until he has proven himself worthy before a jurisdictional body. Often after examination he is refused ordination, and he cannot administer the sacraments of the church until he has been ordained.

In Massachusetts a graduate of a school of pharmacy cannot be allowed to put up a prescription until he is examined. In Chicago a man who owns a steam engine, if only of two-horse power, cannot have it run except by a licensed engineer who has been examined by the state board and authorized to run an engine.

There are one hundred and forty-nine medical colleges in the United States, and the literature of the medical profession is teeming with the fact that those schools are so numerous as to degrade medical education. The report from the state of Illinois goes over that ground and shows it up most thoroughly.

The past four years have witnessed a marvelous change, and the next four will witness a still more marvelous change, and we shall finally have in the examining boards competent, skillful, and practical examiners, who will have the confidence of all because of their fidelity to duty and to the profession.

(To be continued.)

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Continued from page 473.)

SECOND DAY—(Continued).

DR. R. R. ANDREWS read a paper on

THE GROWTH OF THE CEMENTUM,

which was illustrated by the aid of the lantern. A full abstract of the paper is here presented.

He said that in 1858 Magitot, a French histologist, claimed to have found within the follicle of a developing tooth a special organ for the development of the cementum. Robin and Magitot made a presentation of the same facts in 1861. No other authority that he knew of has recognized the presence of this special organ ; and such men as Kölliker, Waldeyer, Herz, and others have denied its existence. In his own investigations he had not been able to trace it with certainty, although he noticed appearances in a fully-formed follicle of a tissue under the calcifying dentine germ between it and the outer covering of the sacculus, that might admit of the supposition of the existence of such an organ. He had observed this appearance in sections from embryos of the pig and the calf. At a later stage, where the crown is further developed, there are also to be seen infoldings of the tissue at the base of the germ, that may develop into an organ for the growth of the cementum, as stated by Magitot. But in teeth more matured, where the cementum has already commenced its growth, he could not trace even the outlines of a special organ, although he did not consider his investigations to have been extensive enough to warrant him in denying its existence.

Wedl, whose description of the development of the dentine and the enamel is so minute, has but little to say about the development of the cementum. He tells us that at the margin of the crown the dental sacculus contracts, and upon its inner surface the formation of the cement is effected, increasing gradually as the formation of the root advances. The lower segment of the dental sac becomes therefore the root-membrane of the tooth. He believes with Tomes that Nasmyth's membrane belongs to the cement. Again he states that the dentine and cement are connected by means of a layer composed of an agglomeration of transparent globules of varying degrees of thickness ; the spaces intervening between the latter (interglobular spaces) are irregularly notched, and frequently in very close proximity to one another. He considers that the cement commences outside of this layer, but some of Dr. Andrews's sections show it as a dividing line. In describing the methods in which hypertrophy of the cement is formed, Wedl speaks of the various sizes of the corpuscles which form it, stating that many of them have a glistening appearance. Smaller corpuscles are sometimes attached to the sides of larger ones, or are blended with them. Large and small ones also occur separately. These so-called corpuscles Dr. Andrews believes to be globules of calco-globulin, forming, by merging into others, a layer of calco-globulin that shall form the matrix of the hypertrophied cement.

Tomes tells us that it is difficult to point out any distinguishing structural character between primary bone and that of the cementum. The cells close to the surface of the forming cementum which were formerly called osteal cells have now been named osteoblasts. No bone is formed until after the appearance of this osteoblast tissue, and Rollet believes that these osteoblasts are essentially a new growth ; they are so distinctly marked off that it almost assumes the character of an epithelium. If we harden a partially formed tooth in chromic acid, and subsequently decalcify and cut it transversely through the root, we meet with the following structures from without inward. On the outside is the outer part of the sacculus, now the periosteum. Internal to this is a layer to which the name cambium has been given, consisting of roundish cells with processes. These lie in a reticulum made up of cells which give out a small number of homogeneous transparent processes. By the inosculation of these processes a net-work is formed. Between this net-work and the fully-formed cementum lies the osteoblast layer, consisting of much larger cells. As the osteoblasts form a continuous layer and are very numerous, it is obvious that only a small percentage of them ever form lacunæ, or bone-cells, or otherwise retain their individuality. As the process of calcification goes on, the outlines of individual cells become lost in the general transparency of the matrix, only a cell here and there remaining as a lacuna. Again, Tomes states that contiguous osteoblasts become fused together by their exteriors, so that their individuality is lost.

Professor James Tyson, in 1873, writes, "Some difference of opinion existed as to the exact tissue which undergoes conversion into cementum, some alleging that it results from ossification of the tooth-sac, while others, among whom are Kölliker and Beale, believe it to originate in a soft stellate tissue, made up of branching and communicating cells, which are found upon the surface of roots of teeth and within the tooth-sac. This tissue undergoes calcification, spherules of lime being deposited, which gradually fuse and form a transparent, intercellular substance. In this process not all the cells of the stellate tissue become lacunæ of the cementum, but some are obliterated by the deposit, and there are therefore fewer lacunæ in the resulting cementum than in the previous stellate tissue, while the canaliculi are much more numerous than the prolongation of the stellate cells, many of the lacunæ having thirty or forty prolongations, while the stellate cells rarely have more than from ten to twelve. The cementum is more slowly formed than bone and is a more permanent, but probably less perfect, tissue ; its matrix is harder and more transparent, in this respect approaching the dentine."

Klein tells us that the tissue of the tooth-sac represents the matrix from which the cement is formed : its structure and function are that of the osteo-genetic layer of the periosteum ; and that the formation of the cement out of that tissue is identical with sub-periosteal bone.

Dr. Andrews's own investigations show that if we examine the developing tooth just after the cementum has commenced to form, we shall find that the matrix of the cementum is made up of masses or layers of that tissue which we find everywhere on the border-land of calcification, between the organic and inorganic substance. This is a tissue which Tomes has said was produced solely by the destructive action of weak acids, but that his conclusions are erroneous is proven by the fact that this tissue appears in sections where no acid has been used. It is a tissue formed by the coalescing of minute, globular bodies, calcospherites, into globules and layers of a tissue called calco-globulin. The minute globules, in forming the matrix of cementum, seem to come from the osteoblasts and form the calco-globulin layer in somewhat the same manner as he (Dr. Andrews) had described and pictured in the developing dentine. The smaller globules, by merging into each other, form larger ones. They have a glistening appearance, like fat-cells, are about the size of the osteoblasts, but are not cells, though often taken for them. They have no membrane and are without a nucleus. They are the bodies which Tomes and others say become fused together by their exteriors. Outside of the layer formed by the globules, the developing matrix of the cementum, we see a row of cells, which Rollet stated looked like an epithelium. They are the osteoblasts, or cementoblasts, and the granules that have been described in their substance are very minute calcospherites, which the cells give out to the forming matrix. Tomes has called them osteal cells. They are the same in appearance as those we see around the edge of the developing bone of the jaw. Just exterior to these cells we find roundish, nucleated cells with innumerable processes, reminding one somewhat of a stellate reticulum, only that the stellate character is not so marked. Just outside these we find the connective tissue, which is really the periosteum. If there exists at this time a special cement-organ, it must be formed by this slight amount of stellate tissue which is between the periosteum and the layer of osteoblasts that are against the forming cementum. In preparing his tissue, so as to have it as near life as possible, he made use of the same methods as were described in his papers on the development of the dentine and of the enamel, and he had found that the osteoblasts, which are said to be full of a peculiar granular substance, are, when the tissue has been properly prepared, filled with minute spherical bodies, which have a glistening appearance. Across the developing matrix of the cement are found numerous fibers, probably connective-tissue fibers, that are also found in developing bone. They were seen and described by Sharpey, and named after him, Sharpey's fibers. They become calcified within the matrix.

As the cementum grows thicker, we find that the developing matrix is infolding in its substance large nucleated bodies which appear to be connective-tissue corpuscles. They are somewhat larger than the osteoblasts, and are forming the cement-cells, or lacunæ. They have a higher function than the osteoblasts,—that is, they are to give nourishment to the matrix, being connected with others by means of canals or processes, of which there are many, some of which run in the direction of the termination of the dentinal tubes, as though connected with them. When inclosed by the developing matrix of the cement, minute, glistening, globular bodies are seen within their outline, or membrane; indeed, it appears as though these minute globules were deposited on the periphery of the cell by the cell itself, and here fusing give the cell its peculiar characteristic shape, which is not as regular as that in bone, and is oftentimes very much larger. Their processes probably anastomose with the dentinal tubules through the interglobular spaces of the so-called granular layer, although he had never been able to trace them. He looked upon the granular layer itself as a condition caused by an arrest of the developmental process, while the first layers of the dentine were being formed. It has its existence solely from the fact that in the first forming layer of dentine the globules or calco-globulin which form its matrix did not fuse together. It is exactly identical with the interglobular spaces found in the crown. The point emphasized in his paper was that the matrix of the cementum is formed from a secretion of the osteoblasts, and this secretion is a multitude of minute globular bodies, given out against the dentine. In a work entitled "General Biology," written by Professors Sedgwick and Wilson, they make a statement that the matrix of a tissue is composed of lifeless matter which has been manufactured and deposited by the living protoplasm constituting the bodies of the cells; and again, cells may manufacture a lifeless substance which appears in the form of solid partition-walls between the cells, or as a matrix solid or liquid in which the cells lie; and again, the cells are small masses of living matter or protoplasm which deposit more or less lifeless matter either around (outside) them or within their substance. The lifeless matter which is given out by the osteoblasts to form the matrix of the cementum is in the form of these minute globules, and these fusing together form larger ones, which, merging, form layers of an uncalcified substance that Professor Harting has named calco-globulin ; this is by further calcification to become the calcified matrix. In speaking of the formation of exostosis, Tomes states that at the junction with the root he finds a substance that is dense. It is torn with difficulty, and under pressure slips about between the two glasses. It is gelatinous, osseous matter, and with it may be seen rounded, amorphous molecules. This is a good description of calco-globulin. Tomes says that cementum is not developed by a direct metamorphosis of the periosteum, but by the calcification of a new growth. Cells are produced, the individuality of which becomes lost in the process of calcification ; the interior of the cells seems stuffed with an opaque and dense substance disposed in large granules, among which the nuclei cannot positively be pointed out. The large granules within the cells are really calcospherites, and careful preparation of the tissue will clearly show them. The merging together of these globules forms a layer, and this calcifying, layer after layer, gives to the cement the peculiar laminated appearance that is so often seen. It is by no means difficult to trace evidences of this globular formation in the cementum of fully-formed teeth. Dr. Andrews said he had several sections of human teeth that show the outlines very clearly,—so clearly, in fact, that one might call it the interglobular spaces of the cement, probably caused from some arrest in the full development of the tissues.

Discussion.

Dr. Geo. S. Allan said that the development of the tooth is considered to be one of the most difficult subjects in the study of the whole body. As to the claim of Dr. Andrews in regard to these bodies which he has shown us, and which he calls calco-globulin and states that they go to form the enamel-rods, the best we can do is to give him the Scotch verdict of "not proven." The three tissues of the teeth are similar, and the matrix in each case similar, but their duties are very different. Enamel is from two to four per cent. animal matter and from ninety-six to ninety-eight per cent. mineral, while dentine is twenty-six to thirty per cent. animal and seventy to seventy-four per cent. mineral. He had examined many preparations of these substances, and tried to see them as Dr. Andrews sees them, but does not interpret them as he does. These little globules may or may not exist in the vital condition ; as to that he could not say. All these sections are made as carefully as possible, but—and it is a big but—it is not proven that they are not post-mortem appearances. We have unmistakable indications of these globular masses, but they are not constant ; sometimes they are not to be found. There is no apparent reason why they may not be post-mortem appearances. It is a very interesting point to determine whether there are two kinds of cells superintending the formation of dentine. In enamel we seldom see a dual character of the cells. The enamel is so entirely different that one form may be sufficient.

Now as to the interglobular spaces. In the dentine these are vastly larger than they are in the enamel; they may extend one-twentieth of the distance across the whole body of the dentine. The conditions are so different between the dentine and the enamel that it would be well to employ different terms to describe them, instead of calling both, interglobular spaces.

The committee on nomination of officers reported the following names: For chairman, J. Taft; for secretary, E. S. Talbot.

On motion, the secretary was instructed to cast the ballot, and the chairman reported the nominees elected.

(To be continued.)

[CORRECTION.—Dr. J. L. Williams writes that the report of his remarks in the DENTAL COSMOS for June, page 472, is not correct. He said nothing about any action of cheeks or tongue, but spoke only of the occlusion of the teeth.—ED. DENTAL COSMOS.]

CONNECTICUT STATE DENTAL ASSOCIATION.

THE twenty-seventh annual meeting of the Connecticut State Dental Association was held in Hartford, May 19, 1891, at which the following officers were elected: Dr. E. S. Gaylord, New Haven, president; Dr. C. C. Barker, Meriden, vice-president; Dr. George L. Parmele, Hartford, secretary; Dr. Jos. H. Smith, New Haven, treasurer; Drs. Jas. McManus, Hartford, Wm. J. Rider, Danbury, and Daniel A. Jones, New Haven, executive committee.

Resolutions were adopted expressing the regret of the association at the death of Dr. Wm. H. Atkinson, extending to his children and friends its heartfelt sympathy; also directing that a copy of the resolutions be sent to the family of the deceased.

GEO. L. PARMELE, *Secretary*,
25 Pratt street, Hartford, Conn.

LEBANON VALLEY DENTAL ASSOCIATION.

THE sixteenth annual meeting of the Lebanon Valley Dental Association was held at the Mansion House, Reading, Pa., on Tuesday and Wednesday, May 19 and 20, 1891.

The annual address was delivered by the president, Dr. H. Zimmerman. The following essays were read: "Our Duty to Our Patients," by Dr. C. R. Scholl; "Atrophy of the Teeth," by Dr. George H. Mayer; "The Use and Abuse of Amalgams," by Dr. J. H. Mease. Discussions took place on "Antiseptics," opened by Dr. E. P. Kremer, and on "Local Anesthetics," opened by Dr. Eli Slegel. A clinic was given by Dr. C. V. Kratzer, on "Simple Bridge-work."

Three sessions were held daily. The last session was devoted to an excursion over the famous "Mountain Electric-Gravity Railroad," with a banquet at the Hill-Top Cottage, given by Dr. W. H. Scholl to the visiting members.

The following officers were elected for the ensuing year: W. S. Huber, Lebanon, president; J. H. Mease, Lebanon, vice-president; H. J. Herbein, Pottsville, secretary; C. R. Scholl, Reading, corresponding secretary, and C. B. Wagner, Lebanon, treasurer.

Ashland, Pa., was selected as the next place of meeting, on the third Tuesday in May, 1892.

C. R. SCHOLL, *Corresponding Secretary*,
Reading, Pa.

ILLINOIS STATE DENTAL SOCIETY.

AT the twenty-seventh annual meeting of the Illinois State Dental Society, held at Bloomington, May 12 to 15, 1891, the following officers were elected for the ensuing year: W. H. Taggart, Freeport, president; Garrett Newkirk, Chicago, vice-president; Louis Ottofy, Chicago, secretary; W. A. Stevens, Chicago, treasurer; F. H. McIntosh, Bloomington, librarian.

The next meeting will be held in Springfield, beginning on the second Tuesday in May, 1892.

LOUIS OTTOFY, *Secretary*,
70 Dearborn street, Chicago, Ill.

GEORGIA STATE DENTAL SOCIETY.

THE twenty-third annual meeting of the Georgia State Dental Society was held at St. Simon's Island, May 19 to 23, 1891.

The following officers were elected for the ensuing year: W. G. Browne, president; S. M. Roach, first vice-president; W. W. Hill, second vice-president; L. D. Carpenter, corresponding secretary; S. H. McKee, recording secretary; H. A. Lowrance, treasurer; J. H. Coyle, W. C. Wardlaw, A. G. Bouton, G. W. McElhaney, and D. D. Atkinson, board of examiners.

The next place of meeting will be Rome, Ga.

L. D. CARPENTER, *Corresponding Secretary*,
Atlanta, Ga.

CONNECTICUT VALLEY DENTAL SOCIETY.

At the twenty-seventh annual meeting of the Connecticut Valley Dental Society, held at Holyoke, Mass., June 10 and 12, 1891, the following officers were elected for the ensuing year: Dr. Geo. F. Harwood, Worcester, Mass., president; Dr. F. W. Williams, Greenfield, Mass., first vice-president; Dr. W. H. Rider, Danbury, Conn., second vice-president; Dr. Geo. A. Maxfield, Holyoke, Mass., secretary; Dr. A. J. Cutting, Southington, Conn., assistant secretary; Dr. W. F. Andrews, Springfield, Mass., treasurer.

Geo. A. Maxfield, D.D.S., *Secretary.*

JOINT MEETING OF THE PENNSYLVANIA AND NEW JERSEY SOCIETIES.

The joint union meeting of the New Jersey and Pennsylvania State Dental Societies will convene at the West End and Ocean Hotels, Asbury Park, N. J., Wednesday evening, July 15, 1891, at eight o'clock. The meeting will continue its sessions Thursday and Friday.

No society business will be transacted at this meeting, and eminent men in the profession will read interesting papers. The clinics will be new and varied in operative and mechanical dentistry. Two large halls connected have been provided for meetings, clinics, and exhibits.

The twenty-third annual meeting of the Pennsylvania Society will convene Tuesday, the 14th, at 10 A.M., for general business only, in Justi's Dental Hall, Philadelphia. The twenty-first annual meeting and anniversary of the New Jersey Society will convene at the above-named hotels, Asbury Park, Wednesday morning at ten o'clock, for business. The afternoon will be devoted to anniversary exercises.

Full programmes will be mailed, on application to Dr. Frank L. Bassett, Girard Building, Philadelphia, or to the secretaries.

C. V. Kratzer, D.D.S., *Secretary for Pennsylvania,*
Reading.

Charles A. Meeker, D.D.S., *Secretary for New Jersey,*
Newark.

NEW JERSEY EXAMINATIONS.

The New Jersey Dental Commission will hold its next meeting for examinations in Asbury Park, N. J., on Monday, July 13, at 10 A.M.

Persons intending to begin the practice of dentistry in New Jersey must make application to the secretary of the board prior to June 30, 1891.

G. Carleton Brown, D.D.S., *Secretary,*
116 Broad street, Elizabeth, N. J.

MEETING OF COMMITTEES ON DENTAL PATENTS.

PRECEDING the meeting of the American Dental Association there will be a meeting held at the Town Hall, Saratoga Springs, N. Y., on Monday evening, August 3, at eight o'clock, of all committees appointed by the different dental societies of the United States, for the purpose of organizing, and taking some action toward the prevention of the further issuing of patents upon operations in the mouth. It is hoped that every society will be represented at this meeting.

S. C. G. WATKINS, *Chairman;*
W. L. FISH, *Secretary*,
For New Jersey Committee.

MASSACHUSETTS DENTAL SOCIETY.

THE twenty-sixth annual meeting of the Massachusetts Dental Society will be held on Thursday and Friday, July 9 and 10, 1891, at the Natural History building, corner of Boylston and Berkeley streets, Boston. Members of the profession are invited to attend.

EDGAR O. KINSMAN, D.D.S., *Secretary*,
15 Brattle street, Cambridge, Mass.

MISSOURI STATE DENTAL ASSOCIATION.

THE annual meeting of the Missouri State Dental Association will be held at Louisiana, Mo., July 7 to 10, 1891.

Papers are announced from some of the most prominent members of the profession, and there is also an attractive programme of clinics, together with an exhibition of electrical motors and appliances.

The usual railroad rates will be given: a fare and a third on the certificate plan. Hotel rates, $1.00 and $1.50 per day.

A cordial invitation is extended to all reputable dentists.

WILLIAM CONRAD,
HENRY FISHER,
J. W. WHIPPLE,
} *Executive Committee.*

NORTH CAROLINA STATE DENTAL ASSOCIATION.

THE next meeting of the North Carolina State Dental Association will be held at Morehead City, August 11, 12, and 13, 1891. It will be a joint meeting with the Southern Dental Association, which convenes there at the same time.

The indications are that it will be a grand meeting. Members of the profession are cordially invited to attend.

C. A. ROMINGER, *Secretary*,
Reidsville, N. C.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS.

THE regular annual meeting of the North Carolina State Board of Dental Examiners will be held at the Atlantic Hotel, Morehead, N. C., on August 11, 1891.

A recent amendment to the dental laws of North Carolina, passed by the legislature of 1891, requires graduates of dentistry, as well as those without a diploma and those who have not registered according to law, to procure license. Failure to comply with the law will subject those violating it to immediate prosecution.

J. F. GRIFFITH, *Secretary*,
Salisbury, N. C.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE twenty-first annual meeting of the South Carolina State Dental Association will be held in Anderson, S. C., July 14, 1891.

Papers and clinics of unusual interest are assured.

B. RUTLEDGE, D.D.S., *Secretary*,
Florence, S. C.

MAINE DENTAL SOCIETY.

THE twenty-fifth annual meeting of the Maine Dental Society will be held at Brunswick, Me., July 21 and 22, 1891.

An interesting feature of the meeting will be an address by Dr. E. Bacon, of Portland, who was the first president of the society.

H. A. KELLEY, *Secretary Executive Committee*,
Portland, Me.

SUSQUEHANNA DENTAL ASSOCIATION.

THE forty-third annual meeting of the Susquehanna Dental Association will be held at the Hotel Raymond, Eagle's Mere, Pa., July 8 and 9, 1891.

VICTOR S. JONES, *Recording Secretary*,
Bethlehem, Pa.

MICHIGAN DENTAL ASSOCIATION.

THE thirty-sixth annual meeting of the Michigan Dental Association will be held at Sault S'te. Marie, August 18, 19, and 20, 1891.

J. WARD HOUSE, *Secretary*,
Grand Rapids, Mich.

EDITORIAL.

INTRODUCTORY.

An introductory statement as to the future conduct and position of the Dental Cosmos is due to its readers from the new editorial management. Those who enjoyed the close friendship of Dr. James W. White know that it was his ambition to publish "a journal devoted to the best interests of the dental profession," which should at all times exert a positive influence for its advancement; and it is certain that whatever rare natural ability, long training, experience, and conscientiousness could accomplish he gave faithfully to the work. He expressed his own spirit in the quotation which appeared upon the cover of the last issue: "Good work—work done in loyalty to duty—never loses its power, and has a sure reward. It adds to human well-being and progress. It stands in solid results, and circulates as moral force. It helps to make men better and does make better those who do it." This was the key-note of his editorial labors and the spirit with which he imbued those who were associated with him.

Believing his ideal to have been the highest, it becomes a simple matter of duty to labor for its realization. The interpretation of the ideal is, however, a matter of personal method; and growing out of this fact, whatever of variation from former lines may occur in the conduct of the Dental Cosmos will take place in the light of what the editor deems to be in harmony with the needs of the profession as he understands those needs.

The elaborate scientific investigations of eminent specialists in the various departments of dentistry, while they possess great value and have thrown much light upon the etiology and therapeusis of pathological conditions, have also to a certain extent created a hiatus between their methods of practice on the one hand and those of the practitioners whose methods are based solely upon clinical experience on the other. Both phases are important, and the evidence now at command should warrant our expectations for greater harmony along these lines. It is therefore proposed, while maintaining the literary and purely scientific character of the journal at its present standard of excellence, to emphasize somewhat more fully the practical and clinical phases of dental art and therapy, believing that such a presentation will aid in the establishment of greatly improved methods of practice.

The editor undertakes the management of the Dental Cosmos in the belief that its wide circulation, its long and close identification with the interests of the dental profession, and the character of its literary and scientific work, taken together, entitle it to recognition as the leading organ of the dental profession ; and upon this it bases its claim to the individual interest and support of its members.

In its relation to its contemporaries the DENTAL COSMOS bids a cordial Godspeed to all who labor with it for the realization of the dental ideal,—the advancement of our common calling.

AMERICAN DENTAL ASSOCIATION.

THE following letter relating to the next meeting of the American Dental Association, to be held at Saratoga Springs, N. Y., August 4, 1891, is published, together with the list of sections, at the request of the chairman of the executive committee, Dr. J. N. Crouse, of Chicago :

DEAR DOCTOR : A resolution was adopted at the last meeting of the American Dental Association, authorizing the executive committee to communicate with members of dental societies and with the dental profession of the country, to the end that the membership of the various local and State societies may be increased ; that the usefulness of the American Dental Association may be advanced, and the relations between it and the local societies be made more intimate. One object is to awaken a lively interest in the meetings of the American Dental Association, and to secure further representation from the various local societies at the annual general meetings. Will you be kind enough to show your pride in your local society by interesting yourself personally in this matter, and secure the appointment of delegates to the next meeting of the American Dental Association, to be held at Saratoga Springs, N. Y., August 4, 1891 ? In addition to the appointment of delegates, we would suggest that your society appoint a committee who will forward to the chairman of each section such matters of interest as have transpired in your society during the year. The facts need only to be given to the chairman or secretary in such shape as to enable him to include them in the general report of each section. The names and addresses of the officers of the sections are herewith inclosed. If the societies of which you are a member have already met, will you send the paper you have read, or an abstract of it, or a brief outline of what you said in the course of discussion, or a short report of the entire meeting, to some one of the chairmen or secretaries ?

We desire a full attendance at the next meeting, as matters of great importance will come before it. Arrangements have been made to secure excursion tickets on the one and a third fare plan, but in order to get the reduction for return trip it is *absolutely necessary to get a "certificate plan receipt" for full fare paid at time of starting, of the agent of whom ticket is purchased.* The best hotel rates will be secured, and all who visit Saratoga will, we hope, be well repaid for the time and money spent in visiting that famous resort.

Yours truly,
J. N. CROUSE,
Chairman Executive Committee.

AMERICAN DENTAL ASSOCIATION.

President, A. W. Harlan, 70 Dearborn street, Chicago ; Secretary, George H. Cushing, 96 State street, Chicago.

Sections.

I. Prosthetic Dentistry and Metallurgy. Chairman, T. S. Waters, Baltimore, Md.; Secretary, W. B. Ames, 70 State street, Chicago.

II. Dental Education, Literature, and Nomenclature. Chairman, C. R. E. Koch, 3011 Indiana avenue, Chicago; Secretary, Louis Ottofy, 70 Dearborn street, Chicago.

III. Operative Dentistry. Chairman, A. E. Baldwin, 828 West Adams street, Chicago; Secretary, N. S. Hoff, Ann Arbor, Mich.

IV. Histology and Microscopy. Chairman, W. X. Sudduth, Minneapolis, Minn.; Secretary, I. P. Wilson, Burlington, Iowa.

V. Materia Medica and Therapeutics. Chairman, A. W. Harlan; Secretary, James Truman, 3243 Chestnut street, Philadelphia.

VI. Physiology and Etiology. Chairman, H. A. Smith, 128 Garfield place, Cincinnati; Secretary, W. S. How, Twelfth and Chestnut streets, Philadelphia.

VII. Anatomy, Pathology, and Surgery. Chairman, T. W. Brophy, 96 State street, Chicago; Secretary, M. L. Rhein, 104 East Fifty-eighth street, New York.

BIBLIOGRAPHICAL.

MATERIA MEDICA AND THERAPEUTICS, with especial Reference to the Clinical Application of Drugs. By JOHN V. SHOEMAKER, A.M., M.D., Professor of Materia Medica, etc., in the Medico-Chirurgical College of Philadelphia. Vol. II of a Treatise on Materia Medica, Pharmacology, and Therapeutics; being an independent volume upon Drugs. Philadelphia and London: F. A. Davis, publisher, 1891. Price, cloth, $3.50; sheep, $4.50.

This volume is devoted, as indicated by the title, to a consideration of every drug contained in the United States Pharmacopœia. Each drug is considered from three different points of view,—its botanical or chemical definition and physical characters; its physiological action; its therapeutical indications. The strength and dosage of each drug is given, its toxicology, antidotes, and special effects upon individual tissues. Illustrative formulæ and suggestions as to administration, and cautions where necessary concerning their use, are appended to the various agents. All noteworthy new remedies, whether officinal or not, are considered with reference to their uses and effects. It is, in fact, as claimed by the publisher, a drug encyclopedia and therapeutic hand-book in one volume. It appears to be abreast of the progress of therapeutic science, and as a ready work of reference cannot but prove valuable to every practitioner.

THE POCKET MATERIA MEDICA AND THERAPEUTICS: A Résumé of the Action and Doses of all Officinal and Non-officinal Drugs now in Common Use. By C. HENRI LEONARD, A.M., M.D., Professor of Medical and Surgical Diseases of Women and Clinical Gynecology in the Detroit College of Medicine. Cloth, 12mo, 300 pages. Price, postpaid, $1.00. The Illustrated Medical Journal Company, Publishers, Detroit.

In this small volume the drugs are arranged in alphabetical order and are so systematized that a great amount of information is furnished in little space.

The evident care given to the epitomization of the materia medica is creditable to the author. But while useful to both practitioner and student, it is not suited to replace text-books for the student who requires a more detailed knowledge of this most important branch of medicine. M. H. C.

PAMPHLETS RECEIVED.

Die Unregelmaessigkeiten in den Zahnstellungen und ihre Behandlung. (Irregularities of the Teeth and their Treatment.) By Otto Walkoff, Dentist, Brunswick. With 130 wood-cuts. Leipzig: Arthur Felix, 1891.

Ueber das Wesen der Narkosen im Allgemeinen mit besonderer Berücksichtigung der Bromäther-Narkose. (Anesthesia in General, with special consideration of Hydrobromic-Ether-Anesthesia.) By Dr. F. Schneider, dentist, Erlangen. Reprint from *Deutschen Monattschrift f. Zahnheilkunde*, 1890. With 33 curves. Leipzig: Arthur Felix.

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OBITUARY.

DR. GEORGE WILLIAMS.

DIED, at Long Stratton, Norfolk, England, April 28, 1891, GEORGE WILLIAMS, D.D.S., in the sixty-fifth year of his age.

Dr. Williams was born at Tidenham, Gloucestershire, England, and resided for a time at Leyton, Essex. He studied dentistry under Dr. Motchwick, and practiced about fifteen years in London; after which he came to America, and graduated from the Boston Dental College, class of 1875. He then entered upon the practice of his profession in Boston, where he not only established an extended business in his calling, but formed a wide circle of friends, who held him in high esteem.

Dr. Williams was naturally of a retiring disposition, but was possessed of rare qualities as a gentleman; was upright in all his dealings; was generous to a fault, and many can testify to the abundance of his charity. From close application to practice, for five years or more his health and strength had been on the wane, and in the spring of 1890 he returned to his native England. He leaves a devoted sister, who had done much to promote his life's comfort and usefulness.

DR. CHARLES G. DAVIS.

Died, in New Bedford, Mass., January 8, 1890, of heart-trouble, Charles G. Davis, D.D.S., aged sixty-five years.

Dr. Davis was born in New Hampshire, in June, 1825. In early manhood he taught school, after which he studied medicine at Dartmouth College, but being of a mechanical turn of mind devoted his attention to the study of dentistry, graduating at the Baltimore Dental College in 1850. Locating in New Bedford, he built up and maintained a large and lucrative practice. He was a member of many dental societies throughout the Union, and was at different times president of the Old Colony Dental Association, Merrimac Valley Dental Association, and Massachusetts Dental Society; also for a time professor in the Boston Dental College.

In the death of Dr. Davis the profession loses one of its truest and ablest members, the community in which he lived a citizen of marked ability and worth, and his family a devoted husband and indulgent father. H. B. Perry.

DR. O. P. MACALASTER.

Died, at Lynn, Mass., May, 1891, of Bright's disease, Oscar P. Macalaster, D.D.S., in the sixty-third year of his age.

Dr. Macalaster was born at Lovell, Me., July 30, 1828. He studied dentistry with Dr. Heald, of Portland, and graduated at the Philadelphia Dental College, class of 1869. For several years he was in practice at Portland, Me., but his more recent years have been spent in professional work in Lynn, Mass., up to the time of his decease.

On September 12, 1865, Dr. Macalaster was married, at Falmouth, Nova Scotia, to Miss Shaw, who, together with one son and one daughter, survives him.

DR. C. E. HAWLEY.

Died, in Shreveport, La., June 9, 1891, suddenly, of paralysis of the heart, C. E. Hawley, D.D.S., in the fifty-first year of his age.

Dr. Hawley was born in Ithaca, N. Y., February 28, 1840. He was a son of the late Dr. Joel E. Hawley, who practiced medicine in that place for many years. He went South when twenty-one years of age, and studied dentistry with the late Dr. Russell, of Nashville, Tenn. He afterward went to Natchitoches, La., to practice, and there married a Miss Boultt; from there he went to Shreveport, La., where he practiced successfully for many years. He graduated from the dental college at Nashville, Tenn., in 1880, and was a member of the Louisiana State Dental Society. He leaves a widow and six children.

PUBLISHER'S NOTICE.

THE EDITORSHIP OF THE DENTAL COSMOS.

THE death of Dr. James W. White having necessitated the selection of another editor for the DENTAL COSMOS, arrangements have been made with Edward C. Kirk, D.D.S., to assume the duties of the vacant position.

Dr. Kirk scarcely requires introduction to the members of the dental profession, and we feel that in placing the editorial management in his hands we are giving it into the care of one who has a due appreciation of the proper purpose of an ideal professional journal, such as has been our aim in the publication of the DENTAL COSMOS.

We commend Dr. Kirk to the good-will of the profession.

It is perhaps proper to say that most of the papers and discussions in the present issue were prepared for the printer by the late Dr. White.

THE S. S. WHITE DENTAL MANUFACTURING CO.

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HINTS AND QUERIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—Dr. Holt, of Goldsboro, N. C., in the March and June numbers of the DENTAL COSMOS, confesses a doubt of the diffusion of remedies when used hypodermatically, and expresses a desire for information on that point. There are three ways by which the action of medicine is secured in the human economy: By absorption and diffusion through the circulatory system; by means of the nervous system; by penetration. The first two methods are instrumental in securing remote rather than local action, and to the third alone is due the greater part of local effects.

The penetrative power of remedies is not identical with their absorption, but is the power that medicines possess of producing their characteristic effects on neighboring but not functionally related parts. Various narcotics will produce local anesthesia without affecting the general sensibility. A frog's foot, kept bathed with laudanum, will lose its power of motion without the general sensibility being impaired. Inflammations of various organs are relieved by certain remedial agents through this power of penetration. The stimulative effect of counter-irritation is due to the same cause.

In attempting to produce local effects one fact must be borne in mind. The reaction of a part is directly proportionate to its degree of vitality. If a part be dead, no effect will be produced upon it except by such agents as have a chemical affinity for its constituents. Again, the greater the nerve-supply to the part, the more efficient will be the action of the remedy.

To state that "a medicine injected under the skin makes for itself a cavity in the tissue, in which cavity it remains until it is carried away by the capillaries," is hardly permissible with the well-known penetrative powers of remedies before us. Free mercury has been found in the abdominal cavity and in the inter-muscular cellular tissues, after inunction of the abdomen with mercurial ointment. Is it practical to believe that it was absorbed, carried through the circulatory system, and deposited in these parts directly opposite the point of application? Arnica applied epidermatically will relieve a sprained tendon. Does it do so by being conveyed to the part through the circulation? Bronchoceles are successfully treated by painting iodine on the throat. Were the curative effects produced through the circulation, why not paint the axilla or the sides of the thorax and secure more rapid absorption? Again, in the use of atropia to dilate the pupil of the eye, the remedy is applied to the conjunctiva and penetrates the cornea, which is devoid of blood-vessels, to its destination.

That this power of penetration is limited cannot be denied, and that tissue will absorb medicines "like dry sponge" is hardly to be expected; but that remedies have the power of producing their characteristic effects on neighboring but not functionally related tissues, without passing through the circulatory system, can scarcely be controverted.—G. E. HUNT, D.D.S., Indianapolis, Ind.

MISTAKE OR MALPRACTICE, WHICH?—A young man, after vainly seeking me at the office one evening, called upon a physician, and pointed to the lower right second bicuspid as an aching tooth. This was at once extracted, and found to be perfectly sound. It was then concluded that the first bicuspid was the aching one, and it was promptly seized and broken short off at the margin of the gum. The physician sought me at home, sending the patient to my office, where we found him with his head between his hands, rocking to and fro in great pain. It was expected by both the physician and the patient that I would at once extract the root, but I relieved the pain with a mixture of cocaine and arsenic, which would also devitalize the pulp. The broken crown showed a small mesial cavity, in which a fruit-seed had been forced and produced the pain from which relief had been sought. A careful examination failed to discover a single carious tooth in the otherwise perfect denture. The bicuspid, which had meanwhile been kept in the patient's pocket, was washed, and after the usual preparation replaced in its carefully washed socket. On the first bicuspid root I subsequently placed a porcelain crown, and the patient has now a complete and comfortable denture.

The physician declares that in the future he will refer dental lesions to the dentist.—A. E. BARKER, Idaho Springs, Col.

TO PREVENT DARK JOINTS.—Grind the joints as true as possible without bevel. Wax up and flask in the usual way. When ready for packing, lay a strip of white rubber behind all joints, observing the utmost care in maintaining cleanliness throughout all the details; the result will be more permanent and satisfactory than where plaster or oxyphosphate is packed between the joints. The latter substances prove an element of weakness to the plate, and must ultimately disappear by solution.—OTTO ARNOLD.

SENSE OF SMELL LOST BY THE USE OF COCAINE.—One of my patients, after suffering for some time from neuralgia, which seemed to radiate from the nose, applied to a physician for relief. He recommended a solution of cocaine to be snuffed up the nose several times daily. After using as directed for a couple of weeks, she was surprised one day to find that she had lost the sense of smell, which has never returned.—J. F. WESSELS, D.D.S., Philadelphia, Pa.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

This bibliography will be continued monthly in the Dental Cosmos, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

CONGENITAL DEFECTS IN ENAMEL.

BY FRANK ABBOTT, M.D., NEW YORK, N. Y.

(Read before the Dental Society of the State of New York, at Albany, May 14, 1891.)

EVERY dental practitioner is more or less familiar with the condition of imperfect or defective enamel upon the crowns of permanent teeth (more especially the incisors and first molars), which I propose to consider under the above heading. These imperfections usually concern the summit of the crown or its vicinity. We see upon an otherwise well-developed crown an almost circular ridge, above which the enamel appears of a grayish-brown color, and in the shape of numerous pointed, thorny projections, the masticating surface of molars appearing as if provided with numerous minute stalactites or stalagmites. (See Fig. 1.)

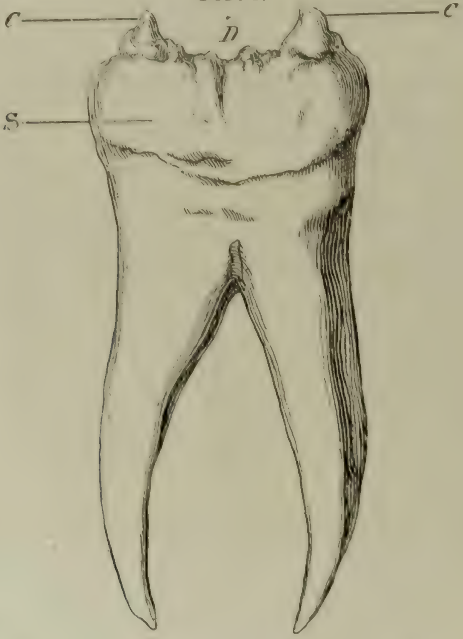
In some cases there are only a few blunt or pointed protrusions of enamel, between which the dentine is entirely destitute of such covering. In others the dentine is nearly covered with enamel, leaving rows of small round or oblong holes through it to the dentine. These features appear, as before stated, only in permanent teeth, and very seldom are any except the incisors and first molars involved. Whether or not the complete absence of enamel from the crowns of incisors, as is sometimes seen, is of the same nature, and due to the same causes, I am not prepared to say, although it seems probable.

Teeth of this description are a source of the greatest annoyance to the patient, since the portions not covered with enamel are usually most exquisitely sensitive, rendering mastication difficult and painful. Operations upon them are so very distressing, that the dentist often finds himself almost helpless to afford relief to his patient, except by the extraction of the teeth.

In looking with the naked eye at a longitudinal section through a molar, affected as just described, we at once recognize the deficiencies of enamel, the stalactite or stalagmite appearance, and the shortening of the crown by about one-eighth of an inch, caused by these deficiencies.

These blunt and pointed elevations are made up partly of healthy-looking and partly of a greenish-brown enamel. Between the elevations are areas partly covered by an extremely thin layer of enamel and partly destitute of it. By grinding the crown of such a tooth in longitudinal section for microscopical examination, the masticating surface presents an extremely striking image. (See Fig. 2.)

FIG. 1.

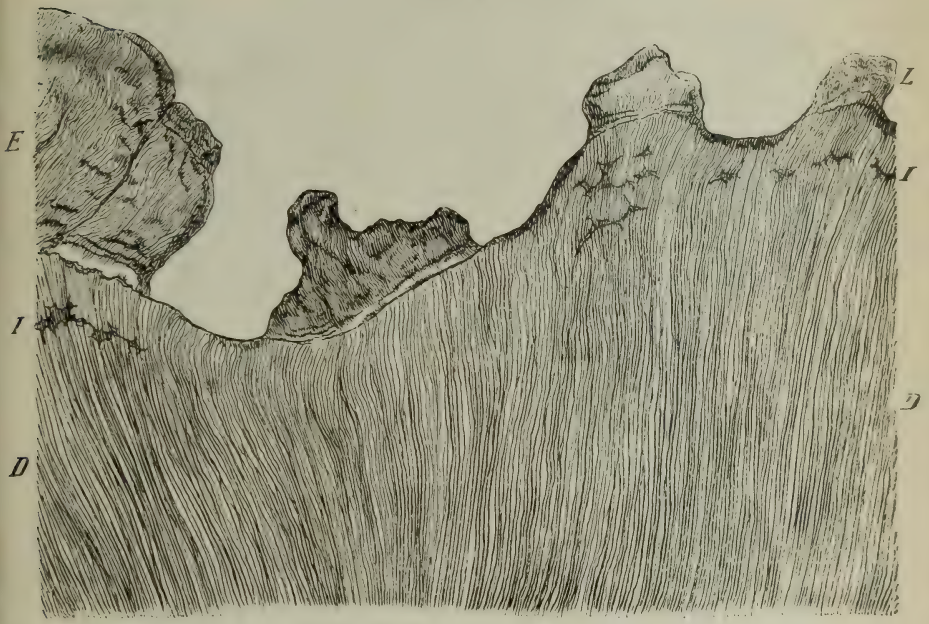


Congenitally imperfect crown of lower molar. *S*, shortened crown; *C*, *C*, cones of enamel; *D*, dentine with no enamel covering. × 4.

A well-developed, though slightly-pigmented, enamel is seen to be gradually tapering toward the masticating surface, showing marked deficiencies of the outermost layer. These deficiencies consist of conical depressions at the surface and granulations near it. Obviously this condition was caused by an incomplete calcification of the enamel, from the fact that it has taken up or absorbed a deep brown pigmentation. The tapering layer of enamel stops abruptly, leaving the dentine entirely uncovered, as is seen in several places; besides, there are irregular hilly protrusions of an irregularly contoured enamel, of a deep brown color. These are the protrusions furnishing to the grinding-surface the appearance of groups of stalactites. Slabs exposed to the action of a half of one per cent. solution of chloride of gold for one hour exhibit a dark violet color of the dentine in the crevices between the enamel lumps, which means that a portion of the lime-salts has been dissolved out, although no destruction of the organic portion of the dentine has taken place. At the usual distance from the interzonal layer are seen interglobular spaces.

Let us magnify a lump of enamel in this locality five hundred diameters. (See Fig. 3.)

FIG. 2.

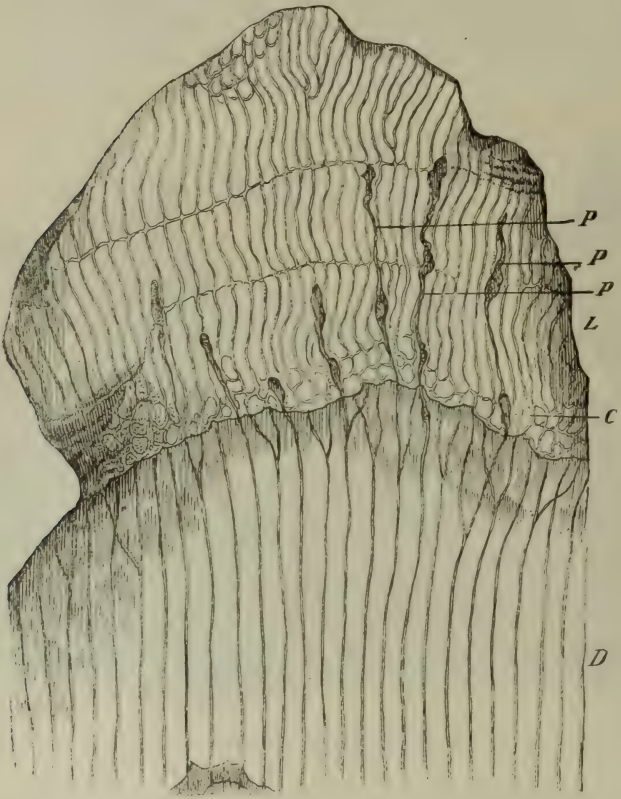


Section of masticating surface, showing partial covering of enamel. *E*, well-developed enamel; *L*, isolated lumps of enamel; *D*, *D*, dentine; *I*, *I*, interglobular spaces. × 100.

We notice in this specimen narrow prisms, markedly wavy, and interrupted by faint concentric striations. The prisms, as usual, do not reach the surface of the enamel, but at a given distance from it they are replaced by irregular angular pieces. The outermost portion of the lump is of a dark brown color. Penetrating the enamel at varying heights are seen numerous pear-shaped prolongations of the dentinal canaliculi, some extending nearly to the surface. These spaces contain protoplasm, and have become stained a deep violet color by the chloride of gold. Aside from these irregularities the lump seems to be thoroughly calcified, except in a few spots upon the surface, which have taken a slight violet stain. The exposed dentine is also deeply stained the characteristic violet color in this locality, denoting insufficiency of lime-salts, or an excess, over the ordinary, of organic material.

I wish at this point to call attention to a paper just prepared by Dr. John I. Hart, of New York, in which he has shown beyond a possible doubt, by means of protracted staining with chloride of gold, that immediately beneath the enamel, in the dentine, there is a very minute reticulum of living matter, considerably more than is found in other portions of the dentine. This corroborates what Dr. Bödecker stated in 1878, and also more satisfactorily explains the clinical fact that at this particular portion of a carious cavity in a tooth, the sensibility is much more acute than in other parts of the same tooth.

FIG. 3.

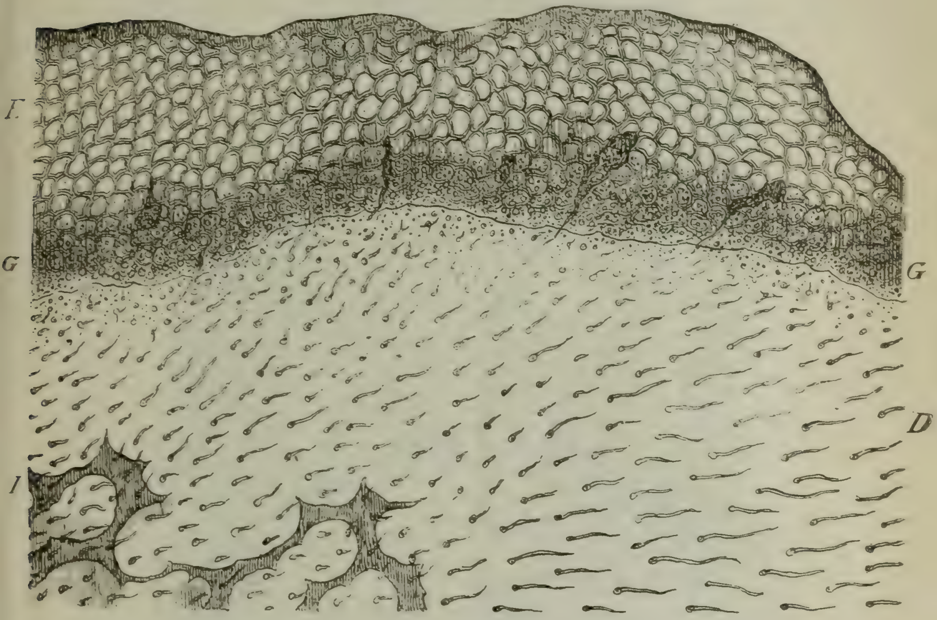


Isolated lump of enamel, very imperfect. *P*, *P*, *P*, protoplasmic projections into the enamel from the dentine; *C*, transverse section of enamel-prisms. × 500.

In some instances the crown of the tooth may be nearly covered with a well-developed or a stratified and slightly pigmented enamel, the other portions being coated with a thin layer highly pigmented, again denoting deficiency in lime-salts. (See Fig. 4.)

We present here a transverse section of the crown of a molar. The thin and irregularly contoured enamel exhibits only transverse sections of prisms, of a deep brown color. At the interzonal layer numerous pear-shaped protoplasmic spaces are seen penetrating the enamel, and in the region nearest the dentine the prisms appear as if granular or sieve-like (perforated with numerous small holes), indicative of a lack of proper calcification.

FIG. 4.

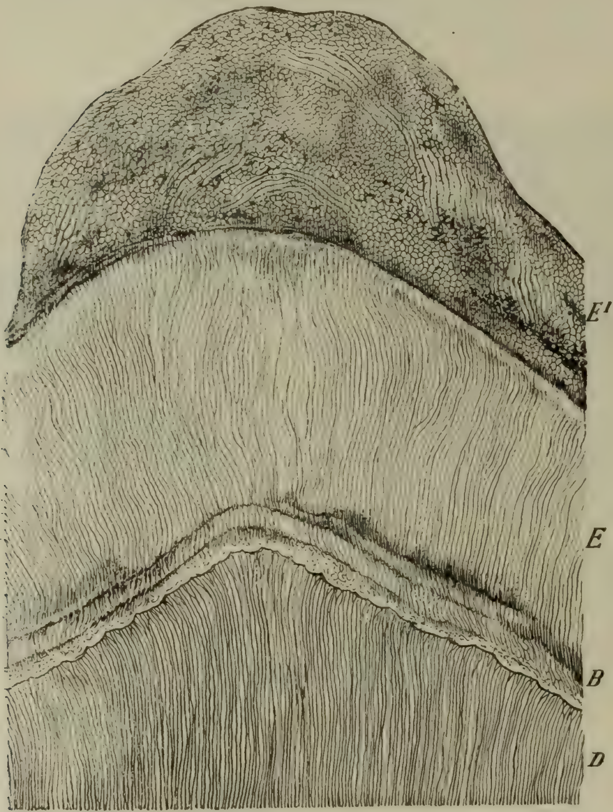


Imperfect enamel. *E*, well-developed enamel, transverse section; *G*, *G*, granular layer of enamel, with pear-shaped protoplasmic enlargements; *D*, dentine, canaliculi in transverse and oblique sections; *I*, interglobular spaces.

I will now call your attention to some extremely interesting and instructive anomalies in the formation of this tissue, viz: two distinct varieties of enamel, one upon the other. First we have the anomalous portion grafted or deposited upon a normal enamel, and again anomalous enamel first deposited, with the peripheral portion fairly normal. (See Fig. 5.)

This represents a cusp of a molar, with a conspicuously deficient enamel, deposited upon a nearly normal one. The normal portion is slightly pigmented, slightly stratified, and supplied with a moderate number of granulations, near the interzonal layer. The outer or peripheral portion exhibits a layer which ends abruptly on one side, and gradually blends with the normal enamel on the other. This portion is remarkably deficient in its structure. At the boundary line between the two portions the enamel-prisms become abruptly devious, their longitudinal course being suddenly changed to a transverse one. In the latter portion a few oblique sections are seen alternating with the transverse. The whole portion superadded to the normal is pierced by innumerable granulations, which, owing to their violet color, we must conclude as protoplasmic in structure and, of course, deficient in lime-salts. The granulations are, in some places, arranged in rows, in others scattered irregularly. If a large mass of enamel exhibits prisms almost rectangular to their original normal direction, it is not an evidence of interlacing of such prisms, but of their unusu-

FIG. 5.

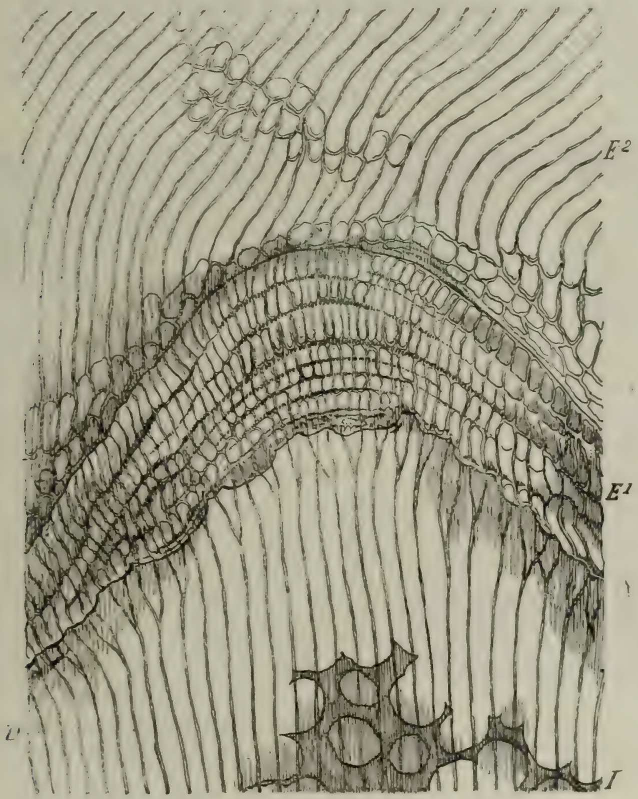


Imperfect, grafted upon perfect enamel. *D*, dentine; *B*, boundary zone (interzonal layer); *E*, perfect enamel; E^1, imperfect enamel. × 100.

ally wavy courses. An originally deficient enamel upon which is deposited a normal one is represented in Fig. 6.

Here we observe numerous layers made up of extremely narrow, interrupted prisms, and at a given line prisms of normal width appear, first in transverse, then in longitudinal sections. This specimen affords a good opportunity to trace one and the same prism in longitudinal, oblique, and transverse section.

FIG. 6.



Perfect, grafted upon imperfect enamel. E^1, irregular and imperfect layer of enamel; E^2, regular layer of enamel; *D*, dentine; *I*, interglobular spaces. × 500.

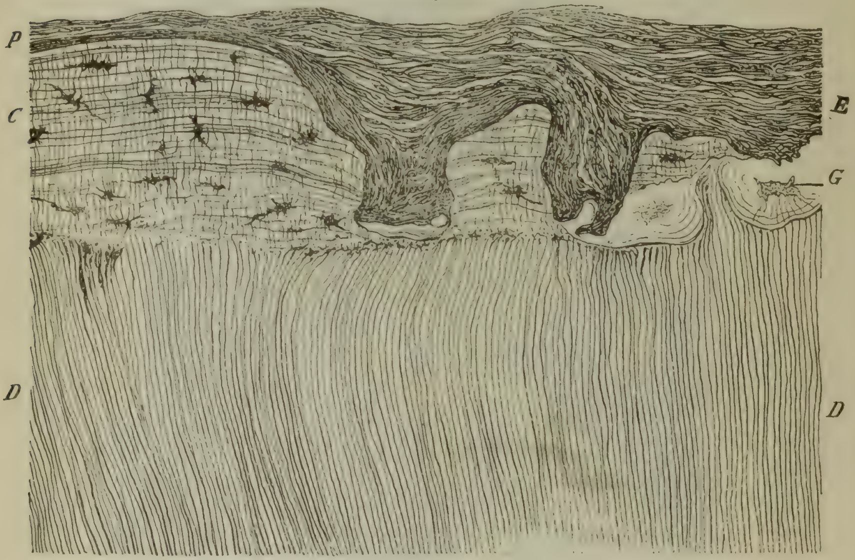
In all the teeth I have examined with imperfect enamel, the so-called interglobular spaces were present in the dentine, indicating a deficient calcification of territories at the period of development, which corresponds with that of the formation of enamel. In only one specimen have I seen a devious course of the dentinal fibers and stratification of the dentine.

In one instance peculiar formations were seen in the cementum. (See Fig. 7.)

The cementum here exhibits distinct lamellations and scattered cement-corpuscles, with their longitudinal diameters mostly arranged vertically to the direction of the lamellæ. The cementum was abruptly interrupted by the dipping downward to the close vicinity of the dentine of the pericementum. In this situation the prolongations of the pericementum were hardened by globular depositions of lime-salts, which were conspicuous by a high degree of refraction.

This anomaly—altogether different from the process of absorption of the roots of temporary teeth, or that of bone—must have occurred at the time of the development of the cementum, which, as is well known, takes place after the formation of the dentine. The morbid process was undoubtedly pericementitis, which led to a partial destruction of the pericementum. At these points, consequently, no cementum was deposited.

FIG. 7.



Irregularities of cementum. *P*, pericementum; *C*, stratified cementum with cement-corpuscles; *E*, excavations of cementum filled with pericementum; *G*, globular stratified depositions of lime-salts; *D*, *D*, dentine. × 100.

A remarkable feature in connection with this case was the apparently perfect condition, in the mouth, of the gum and alveolus. In the pericementum the microscope revealed nothing anomalous except a few scattered calcified patches. It is hardly possible that there is any especial connection between this and the morbid process in the enamel, as the enamel is completely formed at a much earlier period than this could have happened. As to the causes which lead to the imperfections in the enamel and other portions of the teeth during the process of development, I will quote as follows from an article on "Dentition and its Derangements," by A. Jacobi, M.D., 1862. He says,—

"The enamel of the teeth is subject to several anomalies. It may be either defective or discolored. Its defective formation appears either in excavations dispersed over the surface of the tooth, or there are complete furrows or transverse notches around the crown of the tooth, the body being still covered with or entirely deprived of enamel. This atrophy is the result of those severe diseases which the child may have been suffering from during the development of the enamel. Acute exanthems are said to produce the dispersed excavations; acute inflammatory diseases, the furrows; and rachitis has often been observed to be the cause of the entire absence of the enamel. The incisors of rachitic children are usually small, appear late, and are very liable to become carious. Acute exanthems are counted among the causes of this anomaly, especially by such writers as classify the teeth with the dermal tissue. Smallpox is related to produce isolated excavations which have a great similarity to the cicatrices remaining after smallpox. To vaccination, also, some have attributed the defective development of the enamel. . . . The mucous membrane of the mouth is very irritable, being accustomed only to amniotic liquor in fœtal life, and to milk in the early stage of extra-uterine existence. Every change in the diet, therefore, the bad quality of the material, or artificial nipples, the use of candy, sucking bags, or alcoholic beverages, coffee, or stimulants of whatever kind, will act as irritants, producing hyperæmia or inflammation in a more or less severe form. . . . A more severe form is that known by the name of aphthous stomatitis. The superficial layers of the epithelium are not thrown off during the hyperæmic swelling of the mucous membrane, as in erythematous stomatitis, but a real and visible change takes place in the anatomical structure of the follicles. There is a circumscribed, punctated, vascular injection around a follicle which is gradually infiltrated by exudation. The consecutive swelling increases in proportion, the follicles will burst and exhibit a superficial erosion or ulceration, and the adjacent mucous membrane will be sympathetically affected."

In "Contributions to the Development of the Teeth" (Heitzmann and Bödecker, *Independent Practitioner*, vols. viii–ix) will be found several descriptions of anomalies of deciduous teeth depending upon congenital rachitis.

In "Studies of Pathology of Enamel of Human Teeth, with Special Reference to the Etiology of Caries" (Abbott, DENTAL COSMOS, 1885) reference is made to pigmentation, stratification, and white spots in the enamel, to all of which imperfect calcification is attributed as being the cause. Congenital disturbances of the epidermis are known to influence the development of teeth to no small extent.

Edmund Lesser says, "In the majority of haired men, which means congenital growth of hair all over the face (hirsuties), I hitherto have observed that defects or irregularities of the dental system were present, since not only a number of teeth, but the corresponding alveoli, were missing. In some cases of normal dentures a broadening of the alveolar processes was apparent."

We know that the enamel originates from the epithelium of the oral cavity of the embryo. At the development of two months of the fœtus we can trace an epithelial peg which leads to and is in connection with the epithelium of the oral cavity. This peg is prolonged inwardly, and in the third month of development becomes club-shaped at its deepest extremity. It is well known that this epithelial peg, more especially its club-shaped portion, serves for the formation of the enamel-organ. At about the third month, lateral epithelial offshoots begin to appear from the main peg. The latter furnishes the material for the production of the enamel of the temporary tooth, while the lateral pegs furnish the enamel-organs of the permanent teeth.

Although of epithelial origin, the enamel-organ is of a myxomatous structure, and thus represents a variety of connective tissue. The history of development of enamel (which makes its appearance about the seventh month of fœtal life) is well understood, as far as temporary teeth are concerned, up to the time of birth of the child. Still we know nothing as to the progress of the lateral pegs in laying the foundation of the enamel-organ and the enamel of the permanent teeth. We simply conclude that the process is identical with that of the temporary teeth, in its development during the earliest years of extra-uterine life. Since the imperfections of enamel, as described, are observable upon permanent teeth only, I, without fear of contradiction, venture the hypothesis that diseases of the oral cavity only affecting the epithelial layers, and the pegs derived therefrom, must cause these defects. Such diseases occur in the oral cavity of young children, under the headings of inflammation (stomatitis), from many causes, leading to the formation of blisters, ulcers, and abscesses. Growth of mildew (so-called thrush) is known to be a fertile source of both such superficial and deep-seated disturbances.

Acute exanthems, which sometimes spread to the mucous membrane of the oral cavity, undoubtedly play an important part in causing inflammation of the enamel-organ, which results in producing defective enamel.

We can appreciate the probability that inflammation will partially destroy either the original epithelia or the enamel-organ derived therefrom, and thus be the direct cause of defective enamel. A simple obliteration of a number of blood-vessels which freely surround this organ would suffice to so interfere with its proper function as to diminish the amount of lime-salts deposited ; the enamel-prisms in such case might develop normally as to size, but show deficiency in calcification. If, with the inflammation and obliteration of blood-vessels, hemorrhage takes place into the enamel-organ, or infusion of hæmoglobin should occur, pigmentation of the deficiently calcified prisms would become intelligible.

We can realize that the medullary tissue giving rise to enamel-prisms will, in consequence of inflammation, be so altered or misplaced that the outcome would be imperfect, incomplete, or devious prisms. As I showed in 1885 that the formation of enamel takes place in the shape of layers for the crown and layers for the neck, we may grasp the possibility that the earliest crown layers may be fully and regularly developed, while the last crown layers are interfered with and become defective. Should, therefore, an inflammatory process start at the time of the appearance of the earliest crown layers, and soon abate, the enamel nearest the dentine will be found imperfect. If the inflammatory disturbance continues for a long period, the result will be a thin and incompletely calcified layer of enamel. Should portions of the enamel-organ be completely destroyed by suppuration, entire absence of enamel at such points will be the result. A number of so-called miliary abscesses in the enamel-organ will lead to a porous or "pitted" enamel. A limited number of somewhat larger abscesses would cause larger holes or pits, or possibly the entire enamel-organ might be destroyed, leaving the dentine entirely unprotected.

In all the cases of teeth with defective enamel that I have examined, the dentine has been found fully developed and perfectly calcified, with the exception of quite numerous interglobular spaces. These appear in the dentine at the same period of development during which the enamel-organ was affected. This indicates very positively that the disease or diseases which caused the production of imperfect enamel was a local rather than a general one, as has been supposed by some pathologists.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 503.)

INTENTIONAL EXTENSION OF CAVITIES.

In many cases it becomes necessary to extend the limits of cavities beyond the line of carious destruction. Where this extension is internal, and is done without enlargement of the orifice or cavity-border, the course is pursued merely to obtain proper anchorage for the filling. There are, however, times when the borders of cavities must be extended, and these cases we must consider.

It is not uncommon to find a mouth, especially among children, where the point of a fine exploring instrument will readily detect a seemingly tiny cavity in the crown of a bicuspid or a molar. Suppose the patient to be of cleanly habit, the mouth in a hygienic condition, the teeth free from stains, and the caries unaccompanied by discoloration. The operator selects a small rose bur, which slightly enlarges the opening and then sinks into the dentine, throwing out a *débris* of white decay ; to be conscientiously thorough, the case being a bicuspid, he carries the bur along the sulcus to the opposite pit. The cavity is then filled, fine-pointed pluggers and small pieces of gold being used, the whole when finished presenting a beautiful polished appearance. The crown is improved, since now it is jeweled ! Suppose that eight or ten of such narrow streaks of gold be placed in different teeth about the mouth. They ought to last a lifetime, one would think. Then why is it that a year later some leak, while others show a bluish discoloration about their borders?

The reason is that in his endeavor to save tooth-substance the operator did not make the cavities large enough. He did not remove all of the decay, and he could not do so, because, first, he did not sufficiently enlarge the opening to the carious region, and second, he prepared the cavities with a bur alone. It is frequently impossible to detect all the ramifications of decay with an engine-bur, partly because the rapid motion destroys the keen sense of touch, and more often because the position of the cavity is such that the shank of the instrument limits the territory which can be reached. All cavities should be scraped with spoon excavators, and all undercuts explored with a right-angled hatchet. For this reason all crown cavities should be opened sufficiently to permit the use of hand instruments.

Fig. 17 shows an extreme case. The patient presented, complaining that there was a dull pain in an indicated region, which she could not

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definitely locate in any special tooth. A second left superior bicuspid appearing discolored, an examination was made in search of a cavity. A fine explorer was passed, requiring some pressure, into an opening in the anterior pit of the sulcus. On attempting to remove the instrument the entire crown came away, much to the horror of the patient.

Close examination showed that the only defect in the enamel was the small aperture through which the explorer had been passed. Caries had its starting-point here, and reaching the dentine, the devastation continued, without further affecting the enamel, until the pulp had been reached and killed. The crown when cleansed of decay presented as a complete hollow shell or cup of enamel. In Figure 17, which shows a section through the crown, the enamel *b* is seen to be intact except where the probe passed, *a* representing the dentine, all of which was carious.

There is a lesson to be learned here. Whenever caries reaches the dentine, whether through a sulcus in a crown or through the smooth enamel on an approximal surface, further extension of decay will be in the dentine. Enlargement of the orifice is due to the fact that as the enamel loses its support from being undermined, the thinned borders chip or crumble off. This is specially true of masticating surfaces. It follows therefore that all discoloration in the sulci is to be regarded with suspicion. Dark fissures should be opened along their whole extent, sufficiently to allow proper examination with a hatchet excavator. If it is found that the enamel is undermined, the cavity can best be further enlarged with a chisel and light taps of a mallet, thus splitting off overhanging borders with the least pain, and revealing the true extent of the cavity.

FIG. 17.

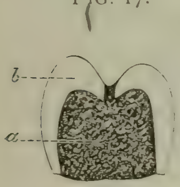


FIG. 18.

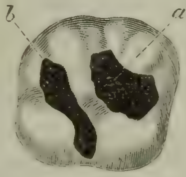


FIG. 19.

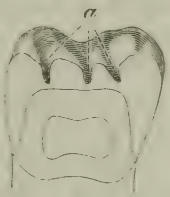
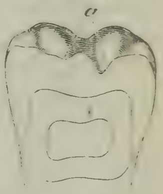


FIG. 20.



Fissure-cavities, however, are to be opened even when not discolored, if a cavity is found at any part of the sulcus. It is poor practice to insert pin-head fillings in such positions. It would be safe to say that the sulcus in a bicuspid should always be opened to its full extent, even when caries appears in but one pit. There may be a few cases which might rightfully be excepted, but, as stated, the rule is a safe one. From this dogma it follows that it is improper ever to insert two fillings in the crown of a bicuspid, one in the pit at one extremity of the sulcus, and one at the other end. The patient is thus made to believe that he receives two fillings, when truly but one is needed, and would serve better than two, since the space between is weak.

In considering molars we perhaps should be less dogmatic, though in the inferior jaw we would still be erring on the safe side, if erring at all, when we cut out the crossed sulci. I heard a professor in a dental college once, in a lecture, instruct his class somewhat differently upon the point as here stated. He said that he had frequently filled lower sixth-year molars, placing one filling at each corner of the cross, and one in the center, charging five dollars apiece. Had this gentleman made a single filling of the whole, charging twenty-five dollars for his operation, he would have been more scientific, more honest, and yet have received the same fee. A man may regulate his fees as he chooses, but he cannot rightfully arrange his fillings for effect, at the expense of durability.

It is necessary here to dilate a moment upon this subject of enlarging the cavities in the lower molars, especially those of the sixth year. We are usually asked to fill them in the mouths of children. The parent has no suspicion that there is a cavity at all, and when the child returns home with a tremendous surface of gold showing, the mother calls at the next visit, charging perhaps that the dentist has "bored a hole in the tooth." This is the opportune time for educating the family. A candid explanation should be made, stating that while it would have been possible to fill the tooth with only a small amount of gold, it would surely have needed refilling in a few years. To those who must have an incentive for doing conscientious work, aside from the gratification of knowing that the most skillful course has been pursued, it may be said that these talks with parents, and patients generally, are sure to redound to the benefit of the operator.

The general rule of cutting out the sulci of course holds also with the superior molars, but here it is often best to insert two fillings. There is commonly found a deep pit in the anterior portion of the crown, a less deep one existing posteriorly, with a sulcus extending well over into the palatal surface. Fig. 18 shows the crown of a superior molar properly filled, the anterior cavity (*a*) being built up so as to be free from ramification of the sulci, and the posterior cavity (*b*) having been cut so as to include the palatal groove. This latter direction should be followed rigidly, except where the groove is rather intimated than actually existent. It will sometimes happen that the anterior and posterior pits, instead of being separated by a ridge, will be slightly connected by a groove across the ridge. In such a case two courses are open, dependent upon circumstances. Where the cavities may be made separately of strong retaining shape, they should be so formed, but in placing the gold the filling may be made continuous from one cavity to the other across the groove. This accomplishes the object with the least loss of substance. Occasionally, however, the filling would be better retained if the two cavities were united, in which case the bur or drill may be used. I prefer an inverted cone bur here, thus forming at once a slight but sufficient undercut.

I said that the prescribed rule cannot be as dogmatically adhered to in the treatment of molars as in the case of bicuspids. This is explained by the assertion that not infrequently cases present where it would be useless to extend a fissure-cavity.

Fig. 19 shows a section through a molar. Where the sulci occur the enamel is seen to have been formed separately over each cusp, there being deep pits (*a*). This class of fissures is frequently found in the mouths of children. To the eye there is no sign of decay, and there may be none, but the fine probe will be caught all along the line of the fissure, and especially where two sulci cross. These imperfections (*a*) are not seen in adult mouths, because where they exist cavities will be formed before puberty. These fissures should be opened and filled, regardless of the absence of decay, as systematically as when decay is present.

Fig. 19 is from a first superior molar, and the natural pits (*a*) are seen anteriorly and posteriorly. This imperfection more often occurs in the inferior molars.

In Fig. 20 we see a section through a superior molar which has simply rounded grooves as sulci (*a*), and the enamel is thick over the dentine at all points. This class of teeth is found in either jaw, though more commonly in the upper, and is usually associated with a strong, fully-developed frame. The teeth are large and the enamel dense. Should caries appear at one end of a sulcus, it would be unwise to extend the cavity as described. It is more than probable that decay has supervened in consequence of some slight imperfection at the special point attacked, to fill which is all that is needed.

To summarize as to crown cavities in molars and bicuspids, I would advise as a rule the placing of but one filling in the bicuspids and lower molars, cutting out the sulci fully. In the superior molars two fillings are to be placed where a marked ridge separates the anterior from the posterior pit. Where the intervening groove is fissured, the cavities are to be united. This will occur more frequently in the second than in the first molar, and more often still in the third molar.

I have advised extending the crown cavity into the palatal groove of the superior molar, but in these cases the posterior fissure is usually markedly continuous with the palatal groove. With the buccal groove it is different. In the inferior jaw this groove often presents with its widest part toward the gum, narrowing as it approaches the crown.

If this groove is non-carious, it would usually be unwise to extend a crown cavity into it ; if slightly carious, it is generally good practice to prepare the cavity pear-shaped, the apex toward the crown, and not to actually connect the crown cavity with it. Where caries is extensive at both points, they must be united, but even then it is best to unite them as little as possible, as by deep undercutting, the buccal walls become very much weakened. Prepare both cavities as though they were to be filled separately, and then pass a bur along from one to the other, making as shallow a channel as is compatible with strength.

Where a crown cavity in a bicuspid or a molar is but slightly separated from an approximal cavity, the two should be united and filled as one. If filled separately, the frail enamel partition must eventually be crushed out under the force of mastication.

There is a kind of extension which is unfortunately too often necessary. A patient presents to have the teeth cleansed. In removing stains along the gum-line of a molar, the enamel is found to have become softened. Examination with a hatchet excavator demonstrates that there are two, or perhaps three, small cavities in close juxtaposition. The rule here is rigid. The cavities must be opened up and formed into a single groove ; moreover, it must be extended as far as the engine-bur will cut easily. All softened or softening material must be cut away until firm margins are reached. I have known such procedure to involve the removal of nearly all of the buccal surface, and once I so formed a cavity completely encircling the tooth near the neck, but, as I have said, this is a rule which must invariably be enforced. A somewhat similar occasion, though from a different cause and different in character, may arise from the use of a clasp-plate. Here extension is indicated in another way. In the first instance, we aim simply to reach a portion of tooth-substance which is strong. In the second, this would not suffice. It will frequently be found that the caries exactly marks the part of the tooth underlying the clasp, the cavity cleaned of decay showing just the form of the clasp. Such a cavity should be extended in all directions, so that when the plate is again placed in position the clasp will not touch the tooth, but will rest against the filling. If this course is not pursued, it is plain that the width of the clasp and of the filling being the same, the edge of one lies just along the border of the other. As all accumulation of food along the edge of the clasp would of necessity be just along the margin of the filling, it is easy to understand that leakage would soon ensue.

We have now to consider the anterior teeth. In this region a new condition enters which must often modify our methods. What would be good practice in an inconspicuous part of the mouth might be very reprehensible in the front of the mouth, because of the resulting disfigurement. This exception to general rules must be further modified by sex, for we might not hesitate to enlarge a cavity in the mouth of a man wearing a heavy moustache, where we should regret exceedingly to place a large gold filling in the white teeth of a handsome young miss.

The central incisors occasionally are found grooved and pitted near the cutting-edge. Suppose that two or three of these pits are found to be actually carious. Shall we unite them by cutting out the groove, as in the case of a molar? Most assuredly not, for by so doing we greatly disfigure the mouth, besides materially weakening the end of the tooth. This class of decay is seen in Fig. 21, and the three cavities shown should be filled separately. The central incisors are usually longer than the laterals, and if this extra length is sufficient to allow grinding off the imperfect end, thus removing entirely the pits and groove, it should be done, provided the centrals are not thereby made shorter than the adjacent teeth.

Fig. 22 shows another condition. The tooth, originally perfect, has become decayed as a result of the presence of green-stain. When the stain is removed, we find, let us suppose, three distinct cavities. The dotted line *a* in the figure indicates the smallest cavity uniting the three which could be made. The result would be a deplorable disfigurement. To unite the two smaller cavities, thus placing two fillings, would be almost as bad. It will therefore be preferable to fill the three cavities separately. Of several evils we must choose the least.

FIG. 21.

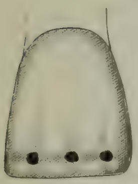


FIG. 22.

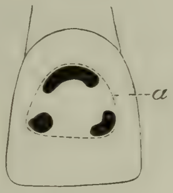


FIG. 23.

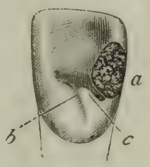
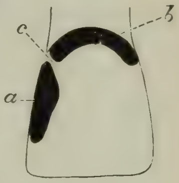


FIG. 24.



The six anterior teeth are sometimes seen with distinct grooves in their palatal surfaces. This occurs most frequently in the lateral incisors, and least often in the cuspids. Of course where such a groove is found with caries at the deepest point, it is essential to cut it out thoroughly. Sometimes there may be no caries in the groove itself, but an approximal cavity closely approaches it. This is shown in Fig. 23, which gives the palatal aspect of a lateral incisor. The palatal border of the approximal cavity, *a*, closely approaches the end of the sulcus, *b*. If we fill the cavity without taking note of the sulcus, it is possible that no future harm may supervene. It is more probable, however, that caries would occur in the groove, and burrowing under the filling would loosen it. It might be claimed that when this occurs would be the time to attend to the case, but it must be remembered that when a tooth has been filled, the generally accepted idea of the patient is that it is safe as long as the filling remains in position. The final loss of a filling by the burrowing of decay beneath it may be delayed for an indefinite period. Thus caries would be progressing without being suspected until a sudden pain gave warning, and by that time the mischief would have been done, the pulp being either exposed or closely approached. It is therefore preferable to fill the groove when treating the approximal cavity. The method of procedure is slightly different from that which would be pursued for a molar. If we unite the cavities at the outset by a fairly deep groove, we would, especially in a lateral incisor, produce a very weak point at *c*, which would be likely to crumble under the mallet during filling. The better plan, therefore, is to fill the approximal cavity first. This being done, prepare a cavity along the sulcus decreasingly deep as you approach the approximal filling, just reaching that point and no more, making it as shallow as would be consistent with strength.

The treatment of a somewhat similar condition upon the labial surface must be quite different. Fig. 24 shows an incisor having an approximal cavity (*a*) and a festoon cavity (*b*). The space (*c*) between is necessarily a weak point, and would be further weakened in preparing the two cavities for the reception of separate fillings. It is much better to fill them as one cavity, cutting away entirely the intervening enamel and dentine.

We now come to a most important subject, approximal cavities. Are we under any circumstances to extend such cavities beyond the borders outlined by the decay? There are certain cases where it is imperative, and others where such a course should be prohibited.

In the six anterior teeth the approximal cavities should be prepared as small as possible, consistent with reaching strong edges. I am aware that this is a dogmatic assertion and at variance with teaching of high authority. Nevertheless my experience teaches me that this course cannot be too emphatically insisted upon. Extension of approximal cavities in incisors has been advised, in two directions. First toward the gingiva, to reach a point anticipatory of the possible recession of the gum; and second around the palatal and labial angles, to reach self-cleansing lines. As to the first proposition, the recurrence of decay toward the gingival borders of a filling, in my opinion, depends not upon the position which the border occupies, but rather upon the form given to the border, the manner of insertion of the filling, and very largely upon the perfection of the finish. As discussion of this must occur at a later point in this work, no more need be said here. As to the second claim, that of reaching self-cleansing surfaces, this will be as good a place as any for determining the point. What is a "self-cleansing" surface? Plainly the term is a misnomer. *No surface can cleanse itself.* Manifestly it is meant to imply a surface readily cleansed by the tongue or lips. The only surface of the former character is the lingual aspect of the six lower anterior teeth. That the tip of the tongue does serve the purpose here, is amply proven by the fact that caries seldom if ever is seen in the lingual surface of a lower incisor, *the only point on any tooth where I have never placed a filling.* I have placed distinctly lingual fillings (not complicated with approximal cavities) in lower cuspids, but never in an incisor. This would limit this saving, cleansing power of the tongue to a single surface, of only four teeth. Then when we remember that this very point is the first place we attack in cleansing a set of teeth, we see what limited ability as a scavenger must be attributed to the tongue. Next we have the lips. It is rare that we observe a cavity in the labial surfaces of incisors or cuspids except along the festoons, under green-stain, or as a result of erosion, in which latter case it is most probable that the lips, or the mucous follicles on their surfaces, produce rather than retard the destructive process. With these exceptions, we must admit that the lips may effect a saving cleanliness. We find that festoon cavities are quite common. This indicates that the farther we get from that part of the tooth—viz, the cutting-edge—which can be reached by the edges of the lips, the less cleansing we observe. *If the lips cannot cleanse along the festoons, it is evident that they cannot, and do not, cleanse around the curve toward the approximal surfaces.* Can this be done by the tongue? It is rarely if ever that one washes the labial surfaces of the lower teeth with the tip of the tongue; and as to the upper, though this is more common, the action is to place the tip of the tongue about the bicuspid region, carry it along toward the bicuspids of the opposite side, and then back. This would wash off the *débris* along the labial surfaces, *but would crowd it between the approximal curved angles*, so that if we are to extend approximal cavities around this angle to reach an imaginary cleansing surface, the extension should be very great. Fig. 25 shows a section through two incisors having approximal fillings as I should advise them to be placed, the borders not having been extended either lingually or

FIG. 25.

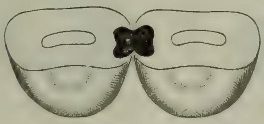
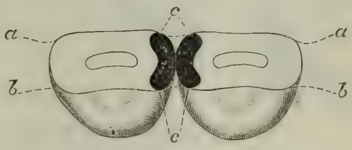


FIG. 26.



labially. Fig. 26 shows a similar section, the cavities having been extended to what are described as "self-cleansing lines," represented in the figure by the lines *a*, *a*, *b*, *b*. These lines indicate the surfaces touched by the tongue as it is passed over the teeth. Observe that the extension of the cavity-borders in the figure has been carried beyond the points of actual contact between the tongue and tooth (*c*), for it is plain that to make a border exactly upon this line would be rather to invite decay than to prevent it. A comparison of these two figures shows to what a considerable extent extension of the cavity-borders must be carried to reach these imaginary "self-cleansing" surfaces, and I argue that when we consider the limitations of this tongue- and lip-cleansing, as a tooth-saving influence, compared to the manifest disfigurement of the mouth by the greater display of filling-material, the comparative infrequency of recurrence of decay along these borders where gold has been properly placed, and more than all the lessened retentive power of the cavity, or greater approach toward the pulp, it follows that to extend an approximal cavity in the six anterior teeth in any direction beyond the amount required for reaching a strong enamel-border is extremely hazardous and unwise.

FIG. 27.

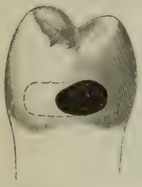


FIG. 28.

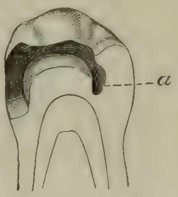


FIG. 29.

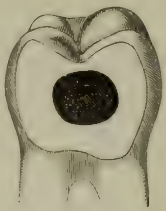
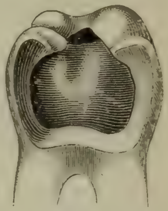


FIG. 30.



Extension of approximal cavities in bicuspids and molars is a different subject. Where such a cavity occurs in a bicuspid or molar distant from the masticating surface, it being either impossible or unadvisable to obtain sufficient separation, it is better to extend the cavity so as to gain ready access than to attempt to fill it with little space. The argument in these cases that such extension must be toward the palatal rather than the buccal surface, is more often written than is the method practiced. It is preferable to extend toward the buccal surface, so that the operator may see his work. Fig. 27 shows such a cavity in a bicuspid, and the dotted line indicates the extension advised.

Where the approximal surface is decayed, presenting a large saucer-shaped cavity of a form most difficult to make retentive without encroaching upon the pulp or producing weak surrounding walls, it is wise to extend the cavity toward the crown and well across that surface, following the sulci and making a deep pit at the opposite end. Fig. 28 shows a section through a tooth so prepared, *a* being the pit depended upon to retain the filling.

A very serious condition is occasionally seen, which has been produced artificially. Under the delusion of saving a tooth from the necessity of being filled, some dentist has filed a "V-shaped self-cleansing (?) space" between two teeth, and then inserted a flat, or flush, filling such as is shown in Fig. 29. The patient complains of constant pain after meals, caused by the impaction of food into this "self-cleansing" space, and the removal of the meat-shreds with a tooth-pick, the constant use of which has brought on a highly congested state of the gum. It is plain that the only remedy is to insert a contour filling. This cannot be done in the small cavity surrounded by thick flat-faced walls, as figured. Therefore the cavity must be extended till the walls are thinned at their edges, assuming the shape shown in Fig. 30. A properly contoured filling may then be made with the assurance that there will be no further complaint after the gum has healed, which will occur very soon.

(To be continued.)

THE QUANTITATIVE AND QUALITATIVE RISE AND FALL OF TEETH IN THEIR RELATIONS TO WORK.

BY J. EDW. LINE, D.D.S., ROCHESTER, N. Y.

(Read before the Dental Society of the State of New York, May 14, 1891.)

In the production of a grass crop, whether managed by nature—as that term is commonly understood—alone, or assisted by the hand of man, there is seen at all times and under all circumstances at least an attempt at adjustment between what is structurally and functionally required, and the food-supply to meet such requirements. Assuming the seed, and at least nutriment sufficient to see it to maturity, the chances are very much in favor of the crop becoming self-sustaining,—drawing in its early development from the soil alone, and later in the more or less developed plant from both soil and air. Under ordinary circumstances—circumstance of food, water, light, and air—the plants will average a given amount of root, a given amount of stem or blade, a given relationship between the two. Under extraordinary circumstances, however, as in upland as distinguished from a valley, or wind-protected piece of ground, this average is changed. Exposed to a stiff breeze day and night, with an occasional gale or cyclone, there is a struggle between the individual plants of the plot or field for the right of standing room, and a corresponding struggle for the available food-supply in the soil to meet this necessarily increased vigor and strength. The more vigorous thrive at the expense of the less vigorous; their roots strike deeper, and the stems or blades, while they may not greatly lengthen, grow more robust, increase in strength, and thus come to withstand conditions that prevail in wind-exposed places. The result may be a thinned-out crop,—fewer blades to the acre,—but a quality superior in vigor and strength to anything possible in a similar crop in less exposed places. Functionally our crop is concerned in feeding; also resisting the breezy element that would lift it out of its place root and branch. With the exercise of this function we have corresponding improvement in structure, not demonstrable optically, perhaps, but in its ability to withstand that which in a weakling would break, possibly destroy it.

Now, in the growing of this crop, the assumption is that it was let alone, not disturbed by other than the elements usually present under the circumstances named. But in its early history, for the sake of a thicker growth, a more numerous showing of blades, such as gives our city lawns their rich, velvety look, the lawn-mower is run over it. What ensues? The requirements of a whole and well-developed blade are cut off and down, and with such lopping there is a corresponding falling off in growth and development of root; for nature is always bent on adjustment of means to ends, and in this instance the production of no more root than the necessities of an undeveloped blade call for. Hence the quick burning out in a dry season of a carefully cultivated lawn, while the grass at the back door, long, trampled down, unkempt, grows and greens till the drouth is ended and the rains add to its lease of life.

But suppose the mower is withheld, and the crop remains uncut till the time of its full growth and development, what follows the application of the cutting process? We have a fully developed root to each plant called into being and activity by the necessities of a full-grown blade. A balance has been struck between the two parts, and at this stage they are mutually or inter-dependent. But now if the mower is applied, the blade is reduced one-half or more, and we find the nutritive supply and the root-means of obtaining it out of all proportion to the needs above-ground. The supply of that which feeds, contributes to vigor and strength, is greater than the demand. Nature finds her energies wasting,—going to purposeless end,—and while the territory and its nutritive constituents heretofore contributing to the growth and maintenance of the plant remain the same, the means of appropriation, the roots, lose in vigor, strength, size, or extent, one or all, and tend promptly and strongly toward the requirements of the blade in reduced circumstances. In other words, wasting or atrophy has set in to meet the new and greatly altered conditions of plant-life.

The quantitative adjustment is seen to be close, until accident or other circumstances breaks such adjustment, but which again, and soon, becomes operative through changes of relations between supply and demand.

The qualitative rise and fall in plant-structure, varying as it does with the functions of the part involved, while not so easily demonstrable, may be shown to exist in a general way in the difference between a lawn protected naturally, or by buildings, from prevailing winds, and a similar growth in places where such protection is not afforded. Assuming its function for the time being to be the maintenance of place against wind and rain,—in other words, "weather," —the greater strength, or resistance to such forces, is easily shown to abide in the plants grown in the more exposed place,— "they bend, but break not in the beating down." The contrary is quite as true of plants under protection,—strong enough under conditions that prevail through the greater part or some years of their life history, but weaklings that easily succumb to conditions for the worse. Experimentally this state of affairs gives us similar results. Grape stocks have been limited to two branches, one each side of the stock,—one branch tied to a horizontal bar or wire, the other left free. The tied branch makes a greater growth, outruns the other in a single season by many inches, but that it lacks the vigor and strength, and inferentially, the structure of its free companion is demonstrated by the mere cutting of the strings; it is incapable of self-support, falls to the ground, while the self-dependent branch sways in the wind in spite of the weight of itself and fruit. Both started with similar, perhaps the same, qualitative possibilities, but their development in the free swinging branch was in response to the conditions that made strength and vigor necessary to its welfare.

Leaving the grass-plot for the top of a man's head, we get nearer to our subject proper, and a train of results quite as suggestive, if not as convincing. Hair, like the owner thereof, has its limitations. It consumes time in the attainment of growth, reaches a length that seems to be characterized by fixity, maintains itself for the allotted time, and then, like other structures, declines and eventually falls. This is of hair left to nature, or trained only to that extent to make the individual presentable in its daily works in life. Under cultivation, as in the case of some famous women, a head of hair that has seemingly reached the limit of say two feet may be stretched to four or six, and its maintenance assisted by correspondingly careful cultivation of the source of its growth. But, like other examples that readily occur to one, this, while interesting and valuable as an illustration of the possibilities of the case, affects our proposition only as a sport among plants affects the general principles of vegetal growth.

Hair left to nature, as is the rule with girls, likewise boys afflicted with hair that shows a tendency to curl, gives ocular proof that it has reached the limit imposed by the nutritive supply by splitting, breaking off, falling out. This may continue indefinitely (does in the case of women to or through middle life), then, because of that general decline shared in by the tissues and organs of the scalp, it loses its color, fades, and falls. All this is in the line of adjustment between the means of growth and the growth itself; and without, perhaps, even thinking of this adjustment, the hair-dresser, in the interests of humanity and art, cuts the ends by several inches, saying, in effect, to nature, "Not as you would have it,—fewer hairs,—but shorter." Where nature would weed out, the hair-dresser effects the same object with the shears. The demand on the nutritive supply is greatly reduced, an attempt made to make the growth in quantity stop just short of the limits imposed by changed conditions in the scalp.

If, instead of a free growth of uncared-for or unkempt hair, or with perhaps mere trimming at long intervals, we have a head clipped early and often, the subject may be put down as an-always-to-be-thin-and-scattered-haired individual with good prospects as a candidate for a bald head. Clipping says in effect that hair is useless, or at least a thing to be kept down. With this operation oft repeated, we have profound modifications in the structural and functional outfit of the scalp. In place of a rise on the part of the elements concerned in the nutritive supply of the hair to meet the demand of a vigorous growth, we have a wasting, shrinking, weakening, with the result that later in life the attempt to raise long hair fails. An adjustment to the requirements of short hair may be followed by a further adjustment to the requirements of long hair, but time enters into the problem as an important element, and this is supplemented again by the further fact that the vegetative, feeding, assimilating function must be actively disposed. The notion that the growth thickens with frequent cutting in youth is founded in fact. Keeping back the longer, larger, more vigorous hairs shifts what they would ordinarily consume as nutriment to weaker neighboring bulbs,—nascent, if you please,—and these, stimulated where before they had starved, contribute their share to the thickening of man's hirsute appendage. But let this grow, and again this recently developed bulb drops to the rear, starved out by its older, abler, more vigorous neighbor, provided this latter has not passed maturity. This is shown in the difference in length, diameter, color, between hairs of older growth and those temporarily called to the front.

The qualitative rise and fall of this growth is so thoroughly interwoven with the quantitative that any special attempt to consider them apart would simply lengthen rather than elucidate. The strength, grip on the scalp, length without split or break, of that which in youth was characterized as a "shock" is too apparent to rank as other than commonplace, and is therefore merely mentioned here.

Thus far teeth have escaped us, but only for the moment, and that it might be enforced by a consideration of things about which there is perhaps less doubt,—that supply and demand between respectively what is required and the object or part requiring the same is constantly subject to the conditions of adjustment. Teeth are no exception to the rule that applies so generously to other things. The manner in which teeth, whether of the first or second set, grow, develop, and erupt, suggests what observation and experience have recorded as fact ever since the dental organs became objects of study. The span of human life begins and ends at milk. The transition from liquid to solid food is marked by the eruption of teeth in groups, and the adaptation of the members of these groups to each other, and the exercise of the function of mastication. Under normal conditions these should hold their place, all the time performing their allotted task, until followed, substituted, thrown out of service by their so-called permanent or less temporary successors. Beginning thus, and in a small way, we have a quantitative rise or increase in dental tissue. The pair becomes four, the quartet eight, until twenty is attained, when, after an apparent lull, four more are added and a struggle for place fairly ensues. In the economy of nature, the temporary teeth having served their purpose, and no longer capable of meeting the demands of the system as cutters and grinders, are thrown out, shed, to make room for others better qualified for the work in hand. Here we have a further quantitative rise in dental tissue,—a greater number of individuals, and a marked increase in each individual itself. Provided there has been no loss either in quantity or quality of tissue, the growth and development of the dental apparatus is at its height. There it maintains itself for a time, when begins a change that can never be for the better, but for the worse for teeth as such, and as reducers of food by trituration.

This is the case normally, but the examples that fall under this head and greet our eyes in daily practice are too few to be of any account as an offset to the kind most prevalent and familiar. Decayed temporary and decayed permanent teeth are the rule, and our assumption is that they are thus defective simply for the want of something to do. It was business that called them into existence, and that very thing, and that only (the nutritive supply always what it should be), is necessary to their preservation and health until shed—till solid food becomes a burden and liquid food more than meets the requirements of the purely vegetative functions of extremely advanced life.

But failure in the quantity or quality of work is the rule, and this is compensated for by failure in the nutritive supply. Nature proceeds to rid herself of incumbrances, and the earliest evidences of such effort are found in decay of the deciduous teeth. They melt away, the pulps die, and finally the gum lets go; and the rational explanation is that their work was not sufficient to enable them to appropriate and assimilate what was brought to their door, or what was brought proved too scant for support. They received some, their successors none; but for the first comers it was simply a case of starvation, or "too many pigs, and weak ones at that, in the trough." It may be noticed in this connection that it is not until teeth become numerous that decay begins. A few teeth have much to do; but an increase in number means diminution in labor, and at once there is a reduction in the quantity of tissue: it is cut out by the process of decay. This continues, attacking every tooth, perhaps, until the series is broken by the loss bodily of several of its members, when there is cessation of decay until the balance between supply and demand is again disturbed.

It is not infrequently the case that a denture continues sound until the second and, though less frequently, the third molars appear. With their advent the whole series becomes affected, and our theory accounts for it on the ground that their labor was not wanted; but having been introduced into the family they must be fed, and this act puts every member, not excepting themselves, on short allowance.

And then cases of cervical decay seem to contribute something to this notion. The decay itself means loss of tissue, and the process at times threatens to decapitate the tooth. So of erosion. This loss of tissue lessens the demand for pabulum, and, when a balance has been struck, teeth thus affected seem to take on a new lease of life.

Teeth worn down by attrition, simple grinding upon each other, in time become adjusted to the new conditions, holding their places and doing duty indefinitely, or until further change of condition cuts them down again in number or quantity, or both.

Teeth, too, decay extensively and stop. These, if filled, are again brought into play, the improvement in the surroundings carrying them even beyond what might be termed their allotted period of usefulness. And all this because of the paring down of tooth-tissue in close harmony with the nutrient supply called for by the amount of work forced upon the dental organs by mastication; and it often happens that these teeth hold their place in the jaw better and longer than teeth unaffected. They have a smaller amount of tissue to be fed, and adjustment is closer to the means of supply,—a difference between a small body well fed and a large body half starved.

The same reasoning applies to the loosening of teeth, whether the loosening is charged to obscure causes like constitutional peculiarities, diathesis, recession of the gums, absorption of the alveolar process, pyorrhea alveolaris, or what not, each and every one of them a proximal cause, or mere incident in that more comprehensive plan in the economy of nature for the elimination of useless parts.

An every-day illustration, too, may be found in cases where one or more teeth have been lost from one jaw, and the corresponding teeth of the other have been forced out as if to fill the space. These remaining members are useless, therefore to be gotten out of the way. Give them something to do and the process is stopped, and this is done by the introduction of a number of artificial teeth. But such teeth, we are told, occasionally hold on vigorously, and without much intervention, for a time. Our theory is equal to the emergency: having little to do, their consumption is small. Like the man who, having retired from active business life, a dish of soup sustains him whereas a seven-course dinner failed to fully satisfy him before.

The cases of middle-aged people and those in advanced years in which a few well-placed grinders do all that is necessary for the comfort and welfare of the patient are of common observation. It is also a fact that the introduction of an artificial denture is the most certain way of effecting their ruin. This is charged by the patient and dentist to clasps, bands, contact, retention of food and secretions, and the charge is sustained if these are regarded as proximate causes. But the real cause, the cause back of all proximates, is found in the robbing them of the task to which long and faithful service had given them right and title. Work thrown on the artificial denture was just that much taken from the natural teeth, hence the initiation and continuance of effort in the direction of their removal.

Crowning furnishes another example, in that roots loose enough to all but fall "brace up" when crowned and become good and true members of dental society. Bridging gives us even a better example, many artificial teeth on few roots doing the work of an entire natural denture. The thing to be looked for here is overwork, the demand on few roots or their nutritive supply being such that they fall by the wayside,—a veritable case of tooth-prostration.

Something might be said of the normal number of teeth thrown together in very small jaws; very large teeth also, but regularly arranged; the frequently observed fact, too, that the chronic invalid is usually well equipped dentally, and especially if limited in getting about and performing manual labor. Little food is consumed, but it is fully utilized by the part exercised, and that part in the case of these patients is dental: they never bolt their food.

But further multiplication of details is uncalled for, those given being more than sufficient to fairly present the general proposition and its dependent parts :

That the limitations placed upon teeth in what may be called their life-history make it necessary, under normal conditions, that they should increase not in number only, but that dental tissue as a thing to be weighed and measured should also increase in quantity and quality directly as the labor imposed upon them by the surroundings of their owner. In other words, they should rise to the occasion numerically and otherwise. That maximum having been reached they should pass into a decline, decreasing in number or wasting in quantity, or both, at the same time undergoing a change for the worse in quality. That a reduction in number at the time adjustment between teeth and supporting tissue is perfect is followed by increased activity in the nutritive function, and an attempt made to compel a few members of the series to take upon themselves in addition to their own the work of those that have been lost. That practical illustration may be found in the rise and fall of the normal denture, whether temporary or so called permanent, under normal conditions ; and many more examples, if we note the changes attending or following attrition, extensive decay and filling, loosening of sound teeth, and also those sound and unsound that have lost their antagonists ; roots that have been crowned and bridged, and the teeth of the not freely movable invalid whose localized energy is of that high degree that it seems capable of any effort in this world with further assumption of dental possibilities in the next.

A NOVEL GOLD CROWN.

BY J. H. EPPERSON, D.D.S., RED BLUFF, CAL.

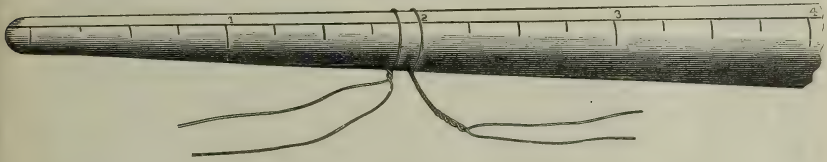
My experience with ready-made crowns has not been satisfactory. Sometimes they would be far from what I would call perfect crowns, although patients would be delighted and think that there could not be anything better ; but I never was wholly satisfied until I invented a way and an apparatus for molding the top or cusps of the crown to the band after the band had been fitted to the root. Those who do not know how to make a crown or a band that will fit the root of a tooth, and yet think that the manufactured article will be a success, are likely to be disappointed, for a person must be able to make a crown in order to succeed with crown- and bridge-work. It is more difficult to fit a whole crown than it is to fit a band ; and if it is not a perfect fit the operation is a failure, notwithstanding the crown may of itself be a model of beauty.

It is not the object of this paper to cheapen crown- and bridge-work, but to perfect it, a very much needed advance at the present time.

All know how hard it is to make gold flow over porcelain in making crowns where porcelain tips or fronts are used, as in bridge-work. The process to be described forces fused gold all over the porcelain surface wherever it may be desired, and is also a great saving in time and material.

When the root has been properly shaped by trimming off all overhanging points, take the measure with a piece of binding-wire twisted tightly around the stump; then get the shape of the root from the wire on the end of a piece of hard wood, and place your wire over the graduated mandrel (Fig. 1), which is like a gauge for measuring finger-rings, only smaller at the point. The one that I had made is one-fourth of an inch in diameter at the small end and five-eighths of an inch at the large end. After you have adjusted the measure to the smooth, round surface and passed it up as far as it will go easily, take another piece of wire, pass it around just below the one for measuring, and when you bring the ends together give them one turn, pulling the ends in opposite directions, and you will have a single lock; slip it off, loosen, and unlock without straightening the wire at the lock. By straightening the part between the locks you have the exact length of the band, which is to be cut and soldered, and will then be correct as to size. Fit it to the wooden mandrel that you have made, then file and fit it to the gum exactly, so that it will strike the gum on all sides at once. Then adjust your band to the tooth: it should go on tightly, with the edge just under the free margin of the gum; grind off the outer edge of the band until the natural teeth will come together. Fill the band about three-fourths full of wax, and while it is in place take a bite with wax. If the band does not come off with the wax—which it hardly ever does—remove it and replace it in its place in the bite, and discharge the patient. Then with a hot spatula fill the band with wax, pour your plaster and place it in a small crown articulator. After the plaster has set, warm and separate. Now take off the band and fit to it a piece of platinum inside, just below the edge of the lowest place in the band (Fig. 2), and if it is for a pulpless root, put in one or more platinum pins to hold on the crown. With white wax build up a crown until you have a good articulation; contour the sides to suit your taste or

FIG. 1.



to fill the space. Trim the wax to the exact shape the crown is to have (Fig. 3) when done. Then invest in the smaller ring (Fig. 4) with plaster and asbestos. After it has set, cut away the plaster over the wax. Soap investment and fill the large ring, close as you would a flask, and put a rubber ring over the handle ends to hold it together. After the investment has set, open, warm, remove the wax, and dry thoroughly. Now place it on a heater (I use Fletcher's gas heater) or in a stove, and heat it red hot; put in gold scraps, which have previously been melted into a button so that they will not take up so much room. With the blow-pipe thoroughly fuse the button, and while it is melted press together the rings (which were held about one inch apart). Let it cool a minute or so by turning off the gas, then open, and if you have not put in gold enough, put in some more and heat again. But it is better to have gold enough the first time, for so much heating endangers the band. There should be a little surplus gold, so that it will mold under pressure. Fig. 5 is a section through the full-sized rings to show how the investment in the large ring has been cut away so that only the cusp part of the matrix shall shut closely and force out the surplus. Cool, grind off the points, smooth the surface, polish, and set in the usual way (Fig. 6).

FIG. 2.

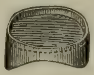


FIG. 3.

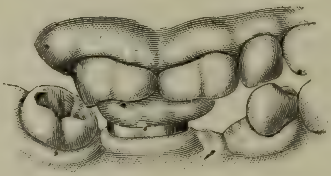
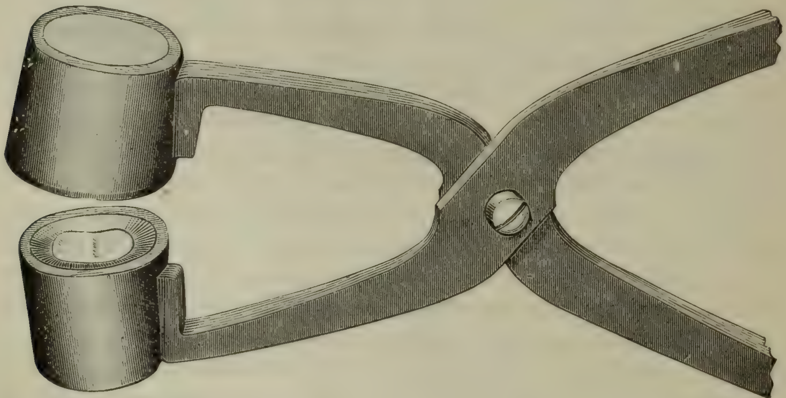


FIG. 4.



Now you have a crown that will last a lifetime, fill the space perfectly, and articulate exactly. But if you should get one on too long you can grind it with perfect safety, as the cusps are thick and heavy.

FIG. 5.

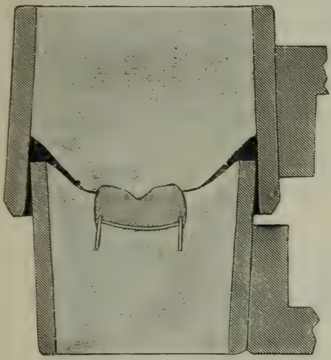


FIG. 6.

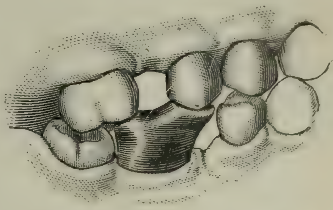


FIG. 7.

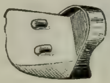


FIG. 8.

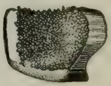


Fig. 7 shows a plain plate central ground to fit a floored band like Fig. 2. No backing is required, but the pins are bent flat on the back, and the tooth secured to the band with hard wax as usual. When invested in the smaller ring (Fig. 4) and the wax removed, the piece will resemble Fig. 7; and when the gold has been melted in and molded by pressing the rings together, the cooled piece will appear as shown in Fig. 8, requiring merely to be finished and mounted.

REMOVABLE CROWN- AND BRIDGE-WORK.

BY DR. C. S. WIGGINS, HORNELLSVILLE, N. Y.

THE two main features of the improvement about to be described are the removable attachment of a collar and its crown-backing to a tooth-root, and the removable attachment of a porcelain face to the crown-backing. Such an organization may constitute a single dental substitute, or several of them may serve as piers for a bridge denture.

The root end should have its margin slightly rounded, and the surface concaved as shown in Fig. 1. The post has its outer end split as in Fig. 2, and is then securely set in the root with amalgam, which also fills the concavity and is made flush with the margin (Fig. 3), thus protecting the root end from attack by caries if by any means the oral fluids were to gain access to it. A disk of thin platinum plate is punched to allow the passage of the projecting post, and is burnished over the face and margin of the root end, and may in some cases be carried over the sides to form a collar, but usually a collar is first fitted to the root, and the cap fitted to the collar. Gold or 20-carat solder is then flowed over the cap to thicken it and unite it to the collar (Fig. 4). A plain plate tooth is selected, the pins cut off, and the back ground flat. With a diamond disk or an E corundum disk the sides of the tooth are grooved as in Fig. 5, and a thin platinum backing like Fig. 6 fitted to the tooth and burnished into its grooves so that it will readily slide in and out of the backing. Pure gold is then flowed over the back of the backing and its flanges to stiffen it. A piece of platinum plate is cut to resemble Fig. 7, and bent upon the shaper, Fig. 8, into the form of Fig. 9. This box is then neatly soldered with pure gold on the back of the backing, the wide end of the box pointing outward. The backing and its grooved tooth are then adjusted upon and fitted to the cap on the root, and the cap and backing secured to each other by hard wax. After careful removal the grooved tooth may be slid from the backing, and this invested so that solder may be flowed over its back and the box to give strength and contour. Then that part of the backing inclosed by the box is cut away with an engine bur (No. 37 or 59) up to the borders of the box as shown in Fig. 10. This united cap and backing after putting a very little cement in the cap may then be placed upon the root, the split ends of the post be forced apart within the box, and so firmly secure the cap and backing upon the root (Fig. 11). A little cement is then packed between the split-post ends and on the end of the grooved tooth (Fig. 12), which is then forced into place, making a sightly and firmly mounted superior central tooth-crown as illustrated in Fig. 13. The sectional view, Fig. 14, shows the organization in all its related parts.

FIG. 1.

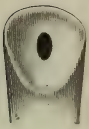


FIG. 2.

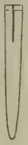


FIG. 3.

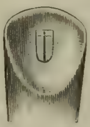


FIG. 4.

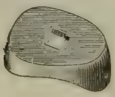


FIG. 5.

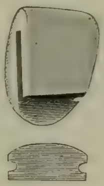


FIG. 6.

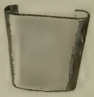


FIG. 7.

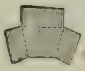


FIG. 8.

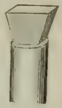


FIG. 9.

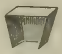


FIG. 10.

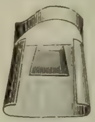


FIG. 11.

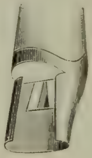
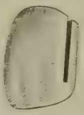


FIG. 12.



Figs. 15 and 16 exhibit a bicuspid crown similarly constructed. It is obvious that the porcelain face may if desirable be slid from its seat, exposing the separated ends of the post so that by picking out the cement and pinching the post ends together the cap and backing may be readily taken from the root, and as readily reset upon it. So, too, in the event of the breakage of a porcelain, another may be grooved and ground to fit the backing.

Fig. 17 shows the bridge organization, the part between the piers being made up of soldered socket-backings. The absence of the grooved porcelain from the right cuspid makes clear the removable anchorage of the bridge upon its pier root, and the absence of the incisor porcelains shows how easily they may be taken off or put on without the least disturbance of the bridge.

FIG. 13.

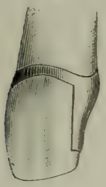


FIG. 14.

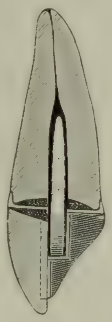


FIG. 15.

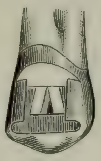


FIG. 16.

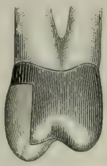
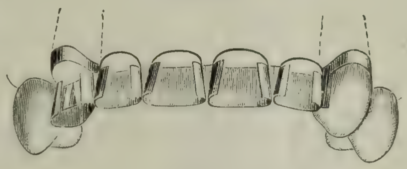


FIG. 17.



By the method thus briefly described it is practically demonstrable that a single artificial crown or a bridge denture may be made without the application of heat to the porcelain faces, and that these, their sockets, or the bridge may for repair or for any purpose be removed or replaced by the dentist without injury to the supporting roots or inconvenience to the patient under any ordinary or even extraordinary circumstances attending the provision of secure and permanent dental substitutes.

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PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, June 9, 1891, in the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. Norman W. Kingsley, in the chair.

Dr. Louis C. LeRoy, of the clinic committee, read the following

Clinic Report.

The regular monthly clinic was held this afternoon at the new depot of The S. S. White Dental Manufacturing Company, in the Lincoln Building, Fourteenth street and Union Square. The number in attendance was one hundred and twenty-seven. . . . Professor Faneuil D. Weisse, of the New York College of Dentistry, gave a clinic upon oral surgery. . . . A gentleman presented his case for diagnosis, having an opening into the antrum at the position of the left superior second molar, previous to the extraction of which tooth he had no trouble in that locality ; but necrosis being evident, Dr. Hindsley, of Bridgeport, extracted it, and the necrosed bone all came away with it, leaving the opening into the antrum. The case was treated antiseptically by Dr. Hindsley and subsequently by Dr. LeRoy, the same having come under his surveillance. There was apparently no necessity to treat otherwise, as the opening and vicinity present a healthy appearance. Dr. Weisse diagnosed the cause of trouble as local, and advised continuance of antiseptic treatment and the use of a plate to cover the orifice, which will probably induce a contraction of the opening into the antrum. . . . Dr. G. W. Hoffman, of White River Junction, Vt., filled a right superior first molar having an extensive crown cavity extending to the cervical margin on the anterior approximal surface. The pulp was capped with Weston's oxyphosphate cement and the cavity filled with Hood & Reynolds's cohesive gold, almost one-eighth of an ounce being used. The operation of placing gold in position occupied thirty minutes, which the doctor said was a longer time than was usual for him in performing such an operation. The Buckingham engine mallet was used throughout the operation for condensing the gold. . . . Dr. M. L. Rowe, of Albany, N. Y., exhibited what he terms the "disk-carrier," which is a mandrel having no movable or removable parts. It has a spiral-formed end of a turn and a half, which by rotating catches the disk. It can be operated while running the engine backward by forcing the disk over the heel of the spiral blade. . . . Dr. H. W. Dibble, of Brooklyn, N. Y., showed a back and direct-action pneumatic mallet. By the simple twist of a collar the direct-action is stopped and the back-action thrown into play at the other end of the instrument. Pressure of a bulb by either the hand or foot regulates the blow of the instrument, which may thus be made heavy or light. . . . Dr. Sidney S. Stowell, of Pittsfield, Mass., showed his "simplicity crown," and demonstrated the method of attachment on models, showing its great strength, and its superiority from an artistic standpoint for crowns and bridges, it being all porcelain. He presented models showing its applicability to all classes of roots, even those so far gone below the gum margin as to seem hopeless for crowning by any other method. Dr. Stowell read a paper before this society about a year ago,* fully describing the simplicity crown and its attachment. The demonstration aroused much interest, and brought out the fact that many are using the method. The doctor also exhibited a sponge shellacked in the frame of an old mouth-mirror. This seems simpler than the Carmichael appliance, which suggested it. Diamond drills are a necessity for his process of crowning, and Dr. Stowell manufactures them by placing the diamond into a fissure cut in the steel, and by then heating the same to a high temperature the softened metal clamps the diamond. The instrument is then reheated and plunged into a mercury bath to harden the metal, and finished by grinding to proper dimensions. . . . Dr. J. W. Canaday, of Albany, N. Y., filled a compound cavity in a superior second bicuspid, using tin and gold for the cervical margin and completing the contour and crown surface with quarter-century foil, condensing with the electric mallet. The cavity had a preparatory filling of oxychloride inserted some four months ago, which reduced the sensitiveness of the tooth so that it could be filled with gold. The doctor also showed fillings of tin and gold throughout of some four months' standing which had become very hard, evidently by an alloying of the two metals.

The report of the committee appointed to prepare resolutions upon the death of Dr. Edward Maynard, made through its chairman, Dr. Dwinelle, was received and unanimously adopted by the society.

Dr. George Evans. Mr. President, since the last meeting of this society, death, that has recently deprived our profession of so many eminent and distinguished members, has again visited us, and has taken one more,—Dr. James W. White, of Philadelphia. Dr. White was not a member of this society, neither was he an honorary member; but his position in the history of our profession is such that I think we should make suitable recognition of his sudden demise. As the society now adjourns for the summer, and it would not be practicable to appoint a committee, I have drawn up a brief resolution, which I herewith submit with the hope that it will be adopted.

WHEREAS, The First District Dental Society of the State of New York has learned with feelings of deep regret of the death of Dr. James W. White, of Philadelphia, an eminent and learned member of the dental profession;

Resolved, That in the death of Dr. White we recognize the fact that we have lost one who by his labors in dental journalism and literature has contributed largely to the advancement and elevation of dentistry as a profession;

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* See DENTAL COSMOS for February, 1891, page 127.

Resolved, That as an evidence of respect to the late Dr. James W. White, and of appreciation of his valuable services to our profession, these resolutions be entered upon the records of the society, and that a copy be sent to his family and to the dental journals for publication.

Dr. W. H. Dwinelle. We ought not to let this opportunity go by without a passing word for our departed friend. It is true that he was not a member of this society, but he was a member of our profession generally, in a larger and broader sense than many are members of the society. He has contributed a great deal to the advancement of our profession ; he followed closely in the footsteps of his brother, S. S. White, than whom no one had done more for our profession. In the matter of journalism he evinced rare talent and ability, and in regard to the literature of our profession no one comprehended it with a wider grasp or promoted it with more practical knowledge than he ; in the general advice which he gave, and the great advantage which he has been to us, he certainly was unsurpassed. I regarded him as a very superior man, and I regret his sudden departure most sincerely. We can ill afford to spare such men.

I trust we all respond to the sentiments expressed in the resolution just read. I approve of it most heartily, and think that among those who are passing away, and have passed away, none is more entitled to our respect and to our consideration.

The resolution was carried unanimously.

The President. In view of the fact that we are to be favored with two papers this evening, if there be no objection the order of "Incidents of Office Practice" will be suspended. I now take pleasure in introducing to you W. F. Rehfuss, D.D.S., of Philadelphia.

Dr. Rehfuss then read a paper, entitled

ANTISEPTIC METHODS IN DENTAL SURGERY,

of which the following is an abstract :

The introduction of antiseptic methods has revolutionized therapeutics and surgery alike, proving a boon and godsend to surgeons and mankind.

The immense strides manifested in surgery since the epoch of Listerism are wonderful to contemplate when the surgical achievements of recent years are reviewed. Operations formerly fatal are now safely performed with antiseptic precautions. Lister's principles have been applied in all departments of surgery. The dental profession has adopted them in their especial operations with more successful results than formerly. Previous to the advent of aseptic surgery some dentists practiced what would now be recognized as a form of "asepticism," not with the intention of preventing septic fermentation or suppuration, nor to destroy micro-organisms, because the existence of such conditions was then unknown, but, as they expressed it, simply for the reason that, previous to filling tooth-roots and cavities, the treatment of them with creasote, which was a universal remedy, or some analogous medicament, would insure a more successful operation than if such remedies were not employed. This was the recognition of an effect without the knowledge of the cause.

The dental profession is indebted to Professor Miller for the discovery and demonstration of the chemico-parasitic theory of dental caries. As his theories, discoveries, experimentation, and deductions in the field of dental bacteriology are well known, repetition of them is needless. He has established two facts, perhaps the most important of his whole work, viz: the proof of the relationship of oral micro-organisms to the etiology of dental caries; also, that "all fermentative and putrefactive processes of the dental pulp and oral mucous membrane are conditioned by the presence of living bacteria."

The necessity of a more strict and systematic observance of antiseptic laws should be recognized. It is important to precisely recognize the indications for the use of an antiseptic, the particular one applicable in the case at issue, and the most practical method of application to obtain the maximum therapeutic results. Antisepsis in dentistry is yet in its infancy. Its importance is recognized, but the methods of application, though constantly improving, are not yet perfect. When the possibilities growing out of the bacteriological experimentations and discoveries of Miller, Black, and others, combined with our clinical experiences, are attained, the preservation of the teeth of mankind will assume a different and more favorable outlook than at present.

By antisepsis is meant the prevention of septic fermentation in wounds, and the healing of such wounds without suppuration. It is a preventive, a prophylactic measure.

The methods of employing antiseptics in dentistry are by *irrigation*, *disinfection*, and as *antiseptic dressings*.

First. *Irrigation:* the washing out of tooth-cavities, bathing infected and inflamed surfaces of wounds, syringing out abscesses, the use of mouth-washes, etc. For irrigating purposes drugs in concentrated solutions are never applicable; diluted aqueous solutions are always indicated.

Second. *Disinfection:* the destruction of micro-organisms and the products of putrefaction in tooth-cavities, pulp-canals, or wherever necessary. Disinfection may be either immediate or gradual, according to the character of the drug employed. Escharotics, the class of drugs used by the immediate method, should not be applied to living tissue, at least never directly on a living tooth pulp, unless devitalization is desired. By the gradual method a diluted solution, a non-escharotic antiseptic, is used, or essential oils, because of their permanency. These are allowed to remain in action for a period of time sufficient to gradually destroy the bacteria. Disinfection includes the sterilization of instruments.

Third. *Antiseptic dressings* may be either temporary or permanent, —temporary, when an antiseptic action is desired for a limited period; permanent, when the intention is to have such action constant. These dressings are used in the form of powders, on cotton, as a paste, or incorporated in filling-materials.

The following classification embraces such as are most frequently employed. The method of grouping them will serve practical purposes.

1. Acids, organic (vegetable) and inorganic (mineral). Organic acids, such as carbolic, benzoic, salicylic acids, are applied to both tooth-structure and tissues. Inorganic acids are employed only on diseased tissues, never on tooth-structure. For antiseptic and disinfecting purposes they are used in five per cent. and ten per cent. solutions, and include nitric, sulphuric, hydrochloric, boracic, and chromic acids.

2. Iodides: tincture of iodine, aristol, iodol, aseptol, potassium iodide.

3. Mercurials: biniodide and bichloride of mercury.

4. Oxidizing series: hydrogen peroxide, potassium permanganate.

5. Oxygenated essential oils: cajuput, peppermint, thyme, cassia, cloves, eucalyptus, juniper-berry, wintergreen, etc.

6. Wood and coal-tar series: creasote, hydronaphthol, resorcin, etc.

7. Heat.

All of the antiseptics enumerated in the classification can be used in the treatment of tissues. Acids must be diluted until they lose their caustic properties. Mercurials should be used in sufficiently weak solutions to render them non-poisonous to the system. The essential oils are employed in emulsion with bland oils if necessary.

The method of application and purposes of antiseptics in dental surgery must be governed by the anatomical structure of the part and its physical condition. Inflammation of tissues may be either acute, perhaps septic, or putrescent. Each condition requires its own particular and special class of antiseptics. One method or a single class cannot be adapted to every pathological condition. Different antiseptics must be employed, and the methods varied to conform to the especial requirements of the case. Thus, in a tooth having its pulp living, the minute nerve-filaments thereof ramifying through the dentine, it would not be advisable to employ the same powerful antiseptic as when the pulp is devitalized, and the tooth is what we commonly term a dead tooth.

The diagnosis of the condition of the pulp should be accurate, upon it depending the subsequent treatment. If it is a simple inflammation of the pulp,—acute pulpitis,—a sedative should be applied, never an escharotic at this stage. After the pain is relieved, an antiseptic dressing should be left in the cavity. The method of treatment is the same if decay has progressed to the pulp and caused its exposure.

Assuming that such treatment has reduced the inflammation of the pulp, at a subsequent operation the decayed tissue is excavated from the cavity, which must be sterilized before filling.

In the sterilization of tooth-cavities escharotics should not be employed when but little dentine covers the pulp, because of the possible danger of devitalizing it. Essential oils are indicated, oil of cassia being the most efficient, in my belief. As it is volatile, it penetrates the dentine thoroughly and does not destroy tissue. If escharotics are employed and the pulp is living, they should be diluted with glycerin, but if the pulp is devitalized the circumstances are different and these precautions are unnecessary. The cavity must not be simply swabbed out with whatever antiseptic is employed, but time given for its action. I thoroughly indorse Professor Miller's views in this matter.

The sterilization of tooth-cavities by the temporary-dressing method insures the destruction of the micro-organisms. Again, I have adopted the use of permanent antiseptic dressings, which are inserted in the bottom of the cavity, and then covered with the tooth-filling. These dressings consist of oil of cassia and iodoform incorporated with an oxyphosphate of zinc filling. Eucalyptus or other efficient antiseptics may be substituted for those advised. These methods can be varied and different antiseptics employed.

I believe and contend that many unsuccessful pulp-cappings are due in part to the lack or neglect of antiseptic treatment, or because such treatment has not been properly or faithfully pursued, giving rise to inflammation, sepsis, and consequent devitalization of the pulp.

The use of escharotic cappings is also responsible for many failures. The capping placed directly in contact with the pulp causes a devitalization of the superficial tissues. It is an open question as to whether the pulp will absorb this devitalized tissue or whether the escharotic will keep the pulp in an aseptic condition.

It is universally conceded that previous to capping a pulp it should be in a healthy, normal condition. I have capped such pulps with a paste of carbolic acid, iodoform, and oxide of zinc, or substituted creasote for the carbolic acid ; and also have used oxychloride of zinc and iodoform experimentally. Subsequently, to substantiate my belief that superficial devitalization is produced by such treatment, I have removed the cappings, and instead of the normal pink color of the pulp, found at the point of the capping a shade varying from a dirty reddish brown to a peculiar putty color. My present method consists in first arresting the hemorrhage, if the pulp is bleeding ; it is next sterilized with bichloride of mercury (1–2000), and then dried thoroughly with hot air. The surface of the exposure is brushed with a solution of collodion, iodoform, and eucalyptus. This forms an antiseptic film or skin. When it is dry, another film is added, and this is followed by a third of the same solution, containing, in addition, balsam of Peru, which strengthens the non-irritating covering of the pulp. A piece of goose-quill or a platinum cap, with an antiseptic paste covering to hold in place, is sometimes added to prevent pressure of the filling on the exposure. If it be decided to devitalize the pulp, the method of using iodoform with the arsenic, suggested by Professor James Truman, is advantageous.

After the removal of the *débris* from root-canals, they are to be sterilized. There are several stages in this process. The first is disinfection, using any one of the disinfectants, excepting mineral acids, and usually in full strength, my preference being for bichloride of mercury (1–500). If all traces of the pulp have been removed from the canals, and they have been disinfected, also if there is no apical periodontitis, the indications are favorable for immediate root-filling ; otherwise the canals should be dressed with antiseptics until such conditions exist.

The thorough drying of the root-canals is one of the most important principles in their treatment, because moisture is a factor in the production of germs and putrefactive processes. Within the past eight months I have readopted a method of filling root-canals with antiseptic waxes, which was my practice three years ago, but which I abandoned without a proper recognition of its merits.

The wax consists of paraffin and resin, combined with any antiseptic, and in whatever strength desired.

The method of making the wax is to melt one drachm of paraffin and half a scruple of resin (white) in a porcelain dish, and then add the antiseptic in the proportion desired, the wax acting as a vehicle. It is then thoroughly stirred, poured into molds, and allowed to cool. Small pieces of the wax, in cone shape, are placed in the pulp-chamber, and a canal instrument or broach is heated in the flame of an alcohol lamp and inserted in the mass, thus melting it. The instrument is reheated, and inserted in the canal. The wax will flow to the apex. Quickly withdraw the instrument, and the wax hardens, hermetically sealing the apical foramen. The use of the electric cautery facilitates the introduction of the wax. The superiority of such a root-filling must be recognized. Its antiseptic properties must commend it, aside from its physical properties of easy manipulation, and entire conformity to the part, filling as it does every portion, penetrating the openings in the tubuli of the dentine.

To resist the action of micro-organisms, it is necessary that this constant antiseptic action is not confined alone to the root-filling, but extended also to the cavity-filling. A more efficient method of insuring antiseptic action in a tooth-cavity would follow the production of a chemically antiseptic plastic filling-material. Accepting the chemico-parasitic theory of dental caries, I believe the ideal tooth-filling of the future will be one of that character. The advantages of such a filling would be manifold. A filling possessing continued antiseptic power, providing its physical properties, durability, color, etc., were satisfactory, would fill the requirements of an ideal filling.

Oxyphosphate of zinc cements are not antiseptic, but it is my custom to render them so by incorporating with the cement one of the essential oils, or hydronaphthol, iodoform, aristol, etc. In mixing the cement, four drops of the phosphate liquid are placed on the mixing slab, and one drop of the oil of cassia or eucalyptus is added. These are thoroughly mixed before incorporating the powder in the usual manner. If a powder, such as hydronaphthol or iodoform, is used, it is first incorporated in the cement powder before mixing the filling. The hardness or stability of the filling will not be deteriorated by such treatment.

Amalgams can be washed with oil of cassia, which cleans out the oxides perhaps better than water or alcohol. The amalgam is first well mixed in a glass mortar with a slight excess of mercury; several drops of oil of cassia are added, and the mass is again well triturated. It is then dried on a napkin before squeezing out the excess of mercury. The oil of cassia is not incorporated chemically in the filling, but the odor can be detected in all portions of it. The same principles can be applied in the use of the phosphate cements. Gutta-percha may be treated in the same manner, heating it and mixing with the oil of cassia or cajuput, which dissolves it, though it subsequently rehardens.

These methods are not advocated as specifics in the prevention of recurrence of caries, nor are they to be recognized as the ideal antiseptic filling, but merely as a practical experimental step in the proper direction, and a method of filling whose fundamental principles must eventually be adopted.

The diseases believed to be induced by the presence of bacteria include pyorrhea alveolaris, alveolar abscess, periodontitis (in some forms), forms of stomatitis, gingivitis, suppurative processes of the margins of the gums, thrush, etc.

Controversies as to whether alveolar abscesses are caused by bacteria have resulted in the universal acceptance of such belief. Miller defends this view. His theory is sustained by the fact that an apical alveolar abscess is produced by an inflammation of the pericementum caused by a septic condition of the pulp, and sepsis is a sure indication of the presence of bacteria.

The etiology of pyorrhea alveolaris is shrouded in mystery. Some contend that it is due to constitutional diseases, others to local irritations and disturbances, while a few are inclined toward the belief that the disease is probably of parasitic origin. Whatever its origin, undoubtedly in the majority of cases bacteria are present in large quantities. To them Miller attributes the pus incident to this disease. In these cases the predisposing cause should be treated, whether of constitutional or local origin. Calcareous deposits should be removed from the roots, and the pockets irrigated with antiseptic solutions. Hydrogen peroxide will be found valuable to remove all foreign matter and pus from the pockets between the teeth and around them. Follow this treatment by the application of some tissue-destroying agent, either carbolic, sulphuric, or nitric acid, iodide of zinc, nitrate of silver, etc.; irrigate again, and apply an antiseptic dressing. Constant antisepsis by syringing with antiseptic washes is indicated; and this treatment should be more vigorous than in alveolar abscess treatments, because the fluids of the mouth are constantly bathing these parts, and thus the danger of reinfection is considerable.

In the treatment of the lesions of the oral mucous membrane, such as stomatitis, thrush, ulitis, etc., the same antiseptic methods must be followed, regulating the treatment according to the symptoms and character of the disease. Ulcerated conditions and sloughing tissues require more vigorous and constant treatment than simple inflammatory conditions.

Every oral surgical operation should be performed under antiseptic conditions, because of the danger of inoculation of the wound through the medium of instruments infected with the bacteria in the mouth, causing perhaps inflammation, suppurations, and necrosis, which are not infrequently the cause of septicemia and pyemia, which have resulted fatally. In ordinary operations such as extraction of the teeth, lancing of the gums, etc., antiseptic precautions are not absolutely necessary, but are a safeguard.

Antisepsis requires cleanliness in every step of an operation, so that no germs may be carried to it, particularly through the agency of infected instruments. Aside from this reason, there is the possible danger of inoculating patients with specific diseases, the virus of which may have been left on the instruments after operating on the preceding patient, the knowledge of such a condition being entirely unknown to the operator. Many cases of this kind are recorded, hence all cutting instruments, whether excavators, lancets, engine-burs, knives, probes, etc., should be thoroughly sterilized. The methods of sterilization are simple, and require but a short time. The instruments are placed for a few moments in a five, ten, or fifteen per cent. solution of carbolic acid, kept in covered porcelain dishes. The solutions are convenient, and can be renewed when desired. A more preferable method, if time permits, is to place the instruments in boiling water and allow them to remain five minutes, or heat them in an oven. These are undoubtedly the most reliable methods of sterilizing instruments. Engine-burs may be placed in a covered dish containing alcohol, kept for the purpose on the operating-table. Before using burs they may be laid or dipped in the solution. Revolving in the engine hand-piece immediately dries them by evaporation.

Mouth-washes are of value for general antisepsis of the oral cavity. They may consist of listerine, hydrogen peroxide, eucalyptus, bichloride of mercury, thymol, and various other antiseptics, formed into various effective combinations to fulfill the requirements of the case.

In conclusion, it must be recognized that as the oral cavity is the breeding-ground of the bacteria, strict asepsis must be observed in all dental operations and treatments, otherwise uniform successes cannot be expected. Whatever changes may occur in our methods of operation in the future, antisepsis will always remain the fundamental principle of dental surgical treatment.

Discussion.

Dr. William Jarvie, of Brooklyn. Mr. President, this is a most interesting subject to us, for I think that the necessity for a large proportion of all our operations is caused by septic influence, and anything that will enlighten us as to the properties of the various antiseptics must be of great benefit to us.

The author of the paper just read, in opening, gives great credit to Professor Miller, of Berlin, ascribing much of his knowledge to the teachings of that gentleman; and I have been surprised in listening to him that he has not accepted and applied the results of Professor Miller's experiments, for what he tells us of some antiseptics is entirely different from what we learn from the result of Professor Miller's work.

In treating septic conditions, a knowledge of the properties of the various antiseptics is highly essential to an intelligent use of them. Many of the antiseptics have great power of penetration, but their antiseptic influence is soon gone. Others of the antiseptics penetrate slowly, but their influence is strong and lasting.

The essayist places great value upon the use of iodoform as an antiseptic, but Professor Miller says it is one of the most worthless materials that can be used. The author of the paper, too, places very great reliance upon the use of the essential oils. The essential oils are of hardly any value as antiseptics. For their slightly escharotic properties and as stimulants they are valuable, but the limited antiseptic properties they possess are of very short duration.

The peroxide of hydrogen, when brought into contact with pus and with decomposed tissue, acts strongly for the moment, but it is soon dissipated and becomes inert. In cases where pus is present this agent is valuable ; beyond that it is of no value whatsoever. As an antiseptic, to exert influence for some time, it is of no use at all.

Hydronaphthol, which is comparatively little used, is one of the best antiseptics we have. It penetrates the tissue rapidly, it is quite continuous in its power as an antiseptic and preservative ; but the strongest antiseptic we have is the trichloride of iodine ; it has five times the strength of any other, and in cases of pulpless teeth in the back of the mouth, molars and second bicuspids, it may be used with safety. It has quite an acid reaction, however, and care must be exercised in its use to prevent a solution of the lime-salts.

The bichloride of mercury, as a powder, is the next in strength as an antiseptic, but the great objection to its use is its liability to discolor tooth-substance, and it should never be used in front teeth. But probably the best and most reliable antiseptic we have is carbolic acid, which has been denounced so severely by many. I have heard men say that they have not had any of it in their offices for years. It is not as powerful as the bichloride of mercury or the trichloride of iodine, but it is perfectly safe, as far as its use in the tooth is concerned,—no destruction of tissue, no discoloration of the tooth. It is valuable first for its power in penetrating dead and decomposed tissue, and next for the length of time it will continue to act as an antiseptic.

In one part of his paper the author says that carbolic acid should never be employed upon living tissue, and all through the paper he seems to fear the use of escharotics. It has been my practice to use carbolic acid very freely in certain cases. When I have an alveolar abscess with a fistulous opening, if I can pump carbolic acid through it I feel certain of the success of my treatment.

The essayist dwells upon the use of antiseptics in cavities of decay. To my mind, the use of antiseptics is almost unnecessary in such cases. The best sterilizer in cavities is a sharp excavator or a sharp bur. I do not think we need any antiseptic whatever, further than that which a good filling-material may prove to be.

The essayist also refers at length to the use of antiseptics in cavities of decay, to stop the toothache. I do not believe the antiseptic properties of these agents have anything to do with the relief of toothache in such cases. I believe it is their escharotic properties, whereby the albumen is coagulated and the air excluded from the pulp, that relieve the pain; alcohol, brandy, cologne, almost anything of a mild escharotic nature, is good for this purpose. I have stopped toothache with these agents many times, when I have had nothing else handy.

Dr. J. N. Farrar. I agree with the main points throughout the "warp and woof" of the paper, because they are in accordance with recognized scientific investigations. Which is the best medicine in a given case depends upon the circumstances. Two or three cases in one mouth, which to a beginner might seem to be exactly alike, to an expert might be known to be unlike, and each might require a different treatment.

Concerning the non-escharotic process of capping, I agree with the essayist. I cannot see any benefit to be derived from killing tissue in capping a pulp. To treat an exposed pulp, I carefully remove the decay from around the exposed part, and apply non-escharotic creasote (wood creasote), then carefully dry the cavity with *soft* bibulous paper, and varnish it with fir balsam (not pine pitch) dissolved in chloroform, which sufficiently dries in a minute or two, and leaves a hard film over the pulp; upon this film is then applied phosphate of zinc while in a condition of creamy consistency; then leaving it six or eight minutes to harden, it is trimmed, and covered with another lot of phosphate of zinc mixed so that it will set harder. By this process I very seldom have a failure.

Of course we should draw a dividing-line between cases that we can cure and those that we cannot.

Regarding the treatment of loculosis, or pyorrhea alveolaris, the essayist speaks of benefit from peroxide of hydrogen. That is one of the best medicines we now have; it will root out pus, but it should be remembered that it will also coagulate blood. For abscesses its action is all we can desire, but in pocket disease of the alveolus no clots (caused by this drug) should be allowed to remain in the pocket to break down and react injuriously. I seldom use this medicine, except in the deeper pockets, where I wish to render inert everything that is deleterious. When I do use it, the injection is continued until the drug comes out clear of blood. If not successful, the pockets are thoroughly syringed with warm water and then wood creasote and alcohol, half and half, is applied. Creasote is valuable for preventing decomposition of the clots.

You may query why wood creasote is preferable to the other kind, and why alcohol is added. This wood creasote (which is not found in every drug store), by being practically a non-escharotic, will not destroy tissue, as will the coal-tar product. I do not think that escharotic creasote should ever be used on soft tissues, unless it is necessary to destroy what was erroneously called, in olden times, the "pyogenic membrane." The object of the alcohol is to enable the creasote to mix with the secretions in the pockets, and not to remain in globules, as it would do if used pure. Creasote is very soothing to the tissues, and it hastens the healing process.

By request I have brought along with me a lot of syringes that I constantly use in my office. Here are a dozen or more syringes for treating alveolar abscess, antral diseases, and loculosis alveolaris. [Syringes were passed around for examination.] You are probably familiar with the screw syringe for abscess treatment, as it is in the market. All are nickel-plated, excepting one; and that is made of gold, for using sulphuric acid. There are also several larger syringes, and one aspirator for treating loculosis and disease of the antral chamber. The contents of the socket pockets are flooded out by the two-ounce syringes, and the creasote, etc., are subsequently injected by the screw syringes.

Dr. Ottolengui. May I ask how you use sulphuric acid?

Dr. Farrar. I seldom use sulphuric acid in any form, except for curing fungous growths in a fistula. In a weak form it is sometimes proper to use it deeper to burn out, as it were, the interior of a sac. For this purpose the aromatic sulphuric acid is generally preferred. From exhaustive experiments* I have found that in practice acid in the strength that is proper to use on soft tissues will not disintegrate necrosed bone; but for destroying abnormal growths in soft tissues it is excellent. I apply aromatic sulphuric acid in full strength, but do not leave it long; after a minute or two I wash it out. One introduction will cure, say nineteen cases out of twenty. Occasionally it is necessary to apply it two or three times.

In treating the antral chamber I do not extract a valuable tooth to make a passage for the syringe, but I amputate and take out the offending root, leaving the remainder of the tooth. The practice of preserving the entire tooth having the offending root that has caused the disease (though it might sometimes prove successful), I do not regard as scientific. Of course a tooth that is very bad, not good for anything, should be extracted.

Dr. Rehfuss. I was pleased in one way with the discussion,—for the appreciation of the fact that antiseptics are necessary in dentistry,—but I was not pleased with the criticism of Dr. Jarvie. His criticism that I did not apply the methods of Dr. Miller was unfounded. I know full well that Miller says iodoform has no antiseptic properties, but practical clinical experiences are more important. In conversation with some of our leading surgeons in Philadelphia on this point, they said, "We do not care if iodoform does not destroy germs. It will give us a thoroughly aseptic condition of the wound, which without such treatment we would not have."

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*These experiments were published in the DENTAL COSMOS, July, August, September, and October, 1878.

I wish to say that its action on living tissue is by virtue of its therapeutic properties and the exclusion of germs, rather than its antiseptic qualities. As to his reply that the essential oils are not antiseptic, I think he is entirely mistaken; both Miller and Black accord the essential oils reliable antiseptic qualities. Miller says that oil of cassia will destroy germs in forty minutes, and Professor Black accords oil of cassia probably first place among the antiseptics. Hence I think I am justified in their use; furthermore, I wish to substantiate what I said in regard to abscesses,—that I do not think that in the acute stages it is necessary to inject an escharotic. It is unnecessary when we can get along without them, and I think we can in most cases.

The President. We will now listen to a paper by Dr. D. M. Sabater, of New York, the subject of which is "Necrosis: its Microscopical Appearance, Causes, and Treatment."*

On motion of Dr. Dwinelle, the society extended its thanks to the essayists of the evening.

Adjourned. B. C. NASH, D.D.S., *Secretary.*

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Continued from page 590.)

SECOND DAY—(Continued).

DR. RICHARD GRADY read a paper on

DENTAL INFIRMARY PATIENTS.—THE USE AND ABUSE OF DENTAL CHARITY,

of which the following is an abstract:

He said his object in the paper was to call attention to the abuse of dental charity, to illustrate its magnitude, and to protest against the looseness with which dental colleges dispense their so-called charity. He considered it was lowering the profession in public estimation, pauperizing the people, and defrauding dentists of rightful fees.

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* Dr. Sabater's paper will be published in a subsequent number of the DENTAL COSMOS.

We have learned from the medical press of the startling excess of medical charity in Edinburgh, of the abnormal growth of the out-patient department at Cambridge, of the urgent need of hospital reform in Birmingham, where the out-patients of hospitals "have advanced in twenty years—1867 as compared with 1887—from sixty-seven thousand to one hundred and sixty-six thousand," etc. Almost one-half of the people of Edinburgh receive their medical advice gratis. The population is little over two hundred and thirty-six thousand, of whom one hundred and three thousand and ninety-five are dependent on charity for medical advice.

In New York the amount of free work done in hospitals has increased ninety per cent. in the last decade. In time the hospitals may become as much an enemy to the general practitioner as is the dispensary. A Western medical editor, who, last summer, visited some of the hospitals and clinics of the great metropolis, is quoted as saying, "What was most striking was the great number of well and fashionably dressed, evidently well-to-do people, both male and female, who applied for free treatment. At the ——, on Tuesday, August 12, there were five hundred and sixty-eight patients, and judging from their appearance, we venture to say that three-fourths at least of them were abundantly able to pay for private medical advice."

Concerted opposition to dental infirmary abuse has been organized in Baltimore, and the Maryland Dental Protective Association, composed of a majority of the practicing dentists in that city, not including those pecuniarily connected with dental schools, came into existence February, 1890; the object of the organization being to regulate the administration of dental charity so that the greatest good may come of it. The members, believing that the impulse must come from the dentists rather than from the colleges, are doing what they can to obtain an abatement of the evil which is making such inroads into their practice. Nothing so far has resulted from the movement except the adoption of a resolution, "That each of the dental schools be requested to place in the infirmaries (near the entrance) record-books in which shall be printed in bold type on each page, 'For the poor only,' and in which shall be entered the name and address of all applicants for dental services. After such registration each applicant shall receive a card also headed, 'For the poor only,' if he or she claims inability to pay the usual office fees; all others shall be rigidly excluded from infirmary privileges. This card shall be retained by the patient and presented at each visit, and until the completion of all necessary services, when the card (indorsed by the operating student with his statement) shall be returned to the demonstrator and placed on file. The record-books and the cards shall be open for public inspection at all reasonable times."

The president of the association has also visited the mayor of the city to request that no appropriations be made to the dental schools for 1891, unless in the contract there be included a provision that (1) all applicants for dental services shall be registered, and (2) that the record-books shall be open for inspection. Appropriations of four hundred and five hundred dollars had been made in 1888 and 1889 to one of the dental schools, "for supplying medicines to the indigent sick of the city of Baltimore."

He wished it to be understood that he had no reference to any special college ; his remarks were addressed to the system generally. He had written to deans of dental schools to determine whether dental college infirmaries truly deserve the designation of charities. The general result of the inquiry confirmed the impression that there is an enormous abuse of so-called dental charity by the almost reckless admission of all comers, and that the practice of some colleges is large and pecuniarily profitable.

Some of the information elicited as to infirmary charges and infirmary practice is as follows :

(1) "Our infirmary privileges are extended only to those unable to pay the usual office fees (all others are rigidly excluded); gold fillings, 75 cents to $2.50 ; amalgam and other plastics, 25 cents to $1 ; vulcanite (full upper or lower), $5.50 ; gold or continuous gum, $25 ; no record of 'charity patients' to whom relief is extended without fee other than extractions and pathological cases."

(2) "The charge made is intended to cover actual expense of materials used and whatever may be used in a charitable way ; there is usually a surplus of receipts over expenditures ; minimum charge for filling with gold, 50 cents ; for dentures, $5 ; these amounts vary of course if a large quantity of material is used, or in the case of dentures made on metal bases."

(3) "The dental college charges simply for material used in fillings and dentures, and tries to avoid doing for people who are able to pay."

(4) "We average about eight thousand patients of all kinds yearly ; charge for gold fillings and other work about what material costs, estimating rather over than under, as we can't afford to lose by our good works."

(5) "The fund we collect from our clinics amounts to about five thousand dollars per year of ten months during which we are in operation."

(6) "Charges are slightly more than cost of material ; we aim to have the infirmary self-supporting."

(7) "We try to have the charges for material used cover the waste and as much of the running expenses of the infirmary as practicable."

(8) "Gold for about one thousand patients, for which a profit is charged; make no distinction in patients."

(9) "No regular tariff for services; endeavor to discourage well-to-do by making charges higher than in office."

(10) "Charge for gold filling about one-half what dentists in private practice charge."

(11) "Our purpose is to make infirmary self-sustaining," etc.

The true work—the only legitimate work—of dental colleges should be to educate students for professional life. But this preliminary training should not be used, as it sometimes is, to lower the emoluments of private practice. Over three thousand one hundred students were in attendance at the various dental colleges of the country for the session 1890–91, and the means of subsistence for these men is diminished when dental infirmaries take patients which these graduates should have. The inevitable result of all active competition—lower prices—follows, with the prospect that, as the ranks become more crowded, the competition must become keener.

More than fifty years ago the first dental college was founded. It was the purpose to give the institution a high character from the start. After it had become necessary to establish an operating infirmary, "for the benefit of the students," an announcement was published that there existed abundant opportunity for practical instruction in the infirmary attached to the institution; that the appreciation and consequent demand for such operations as were there performed was steadily increasing among the indigent of the city. Has the stamp of character the infirmary then received endured? Have the purposes of the originators of the infirmary—the benefit of the students and as a humanitarian agency—been perpetuated? Are operations performed for the indigent only? Is the object solely a desire to do good to the poor? Is attendance at the dental infirmary accepted as a confession of poverty? Is it customary for students to be found during the summer vacation in some dental office, or are they to be found at the college filling teeth and making plates for the pecuniary profit of those who, in the language of students, "run the infirmary for what they can make out of it"?

The origin of the dental infirmary has been stated. The evolution of the abuse can readily be traced.

(1) "Operations among the indigent."—"All expenses borne by college."

(2) "Students have the privilege of operating upon their own private patients."

(3) The natural development has been that gratuitous services have been rendered to infirmary patients who could have paid a proper fee; that "during the sessions the operative and mechanical departments

are now so well patronized that every student can obtain as much practice as is possible for him to attend to,'' etc. ''This opportunity for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions.''

That the competition of some dental college infirmaries injuriously affects dentists to an appreciable degree will be obvious on the bare mention that ''about twenty-five thousand patients are attended to yearly'' by one dental college, that ''on an average for nine months in the year relief is extended to about one hundred patients a day'' by another; that one dental college which was ''extending relief to more than two thousand charity patients'' in 1889 reported in 1890 ''more than ten thousand of such cases,'' and another which reported in 1889 ''the charity patients number four thousand three hundred and twelve,'' in 1891 gave the number of cases ''twelve or fifteen thousand.'' None of these are located in the great metropolis, whose college of dental surgery reports only ''about six thousand five hundred patients are treated annually'' [possibly because] ''we charge for the material used in all branches of dental surgery.''

This competition is most onerous to the practitioners who are struggling against the odds of cheap dentistry in an effort to maintain an honorable position. A dentist who would endeavor to obtain practice after the model of the infirmary announcements—''all operations known to modern dentistry performed in most workmanlike manner''—would be accused of unprofessional conduct.

If a corporation of dentists may publicly advertise, why should a private practitioner be debarred?

Lest it should be thought that he was making statements to suit his argument, he asked to be allowed to quote what those think who ought to know best, and proceeded to confirm his statements by citing the testimony of Drs. Shepard, Genese, Groshans, Asay, and others, to the effect that the infirmary practice as at present conducted is detrimental to the patient, student, college, and to the profession generally, and in particular to the practitioner who must live by the legitimate practice of his profession.

In conclusion, he asked, What is the duty of the hour? Is it to close the dental infirmaries? Not at all, except, possibly, during the vacation when no lectures are delivered. But infirmary privileges should be extended only to those unable to pay the usual fees of dentists. He suggested as possible remedies:

(1) To go back to the practice of the time-honored rule creating the infirmary ''for the benefit of the students,''—operations for the indigent only by the students under the immediate direction of their instructors, ''all expenses borne by college.''

(2) Let no students have the privilege of operating upon their own patients during the sessions, either at the college or at their homes.

(3) Provide for dental infirmary privileges to persons recommended by dentists, or by some inquiry agency, familiar with the circumstances of applicants, similar to the Charity Organization Society of Baltimore.

These are simple suggestions, and it only remains for the dental colleges, more especially rival institutions in the same city, to put them in practice.

The interests of the dental profession and of the dental colleges are really identical, and they should be made practically so. The graduates of dental schools, instead of having to suffer from acts injurious to their interests, should be made the objects of a generous parental care. Such consideration would dispel antagonism, and the charity of the public could be confidently appealed to, as well as the support of the profession, even though there might be a falling off in the number of patients at the dental infirmaries.

This is an age of associations, hence it is desirable that state societies be formed which shall co-operate in protesting emphatically against the abuse of dental charity and in taking effectual measures for its correction, so that in case of application for state or municipal aid it may be made known that no such assistance is given in the cities of Boston, New York, Philadelphia, Washington, Chicago, Indianapolis, Cincinnati, Louisville, Minneapolis, or San Francisco by the taxpayers to dental schools.

The paper was discussed at some length by Drs. Taft, McNaughton, Williams, Andrews, and Talbot.

All agreed that there was great injustice to the profession in the gratuitous or professedly gratuitous services by the dental infirmaries to people who could and should pay for the service they needed; also that the advertisements of prices to induce patients to attend the clinics were as unprofessional as would be the same advertisements if used to attract patients to a private practice.

On motion of Dr. J. L. Williams, the following resolution was adopted:

Resolved, That this section would suggest to the National Association of Dental Faculties the importance of correcting any existing abuses of the charities of the infirmaries connected with the colleges and schools.

THIRD DAY.

The section was called to order at 3 P.M. by Dr. J. S. Marshall.

The chairman reported that in the general meeting of the association it had been resolved that the several sections should appoint committees of five to discuss means to advance the scientific value of the different sections of the association; each committee to consist of the chairman and secretary of the section and three members to be appointed by the chair, one of them to continue on the committee three years, one two years, and the third one year. It was further provided that at the end of each year the retiring chairman should take the place of the committeeman whose term expired. The chair appointed Drs. J. L. Williams, J. S. Marshall, and R. R. Andrews.

Dr. G. W. Whitefield read a paper entitled

Pathological Conditions produced by the Action of Dissimilar Metals in the Mouth,

an abstract of which follows.

Qualifying names are employed to designate the varieties of electrical manifestations, as magnetic, frictional or static, galvanic, voltaic or dynamic, and thermal electricity.

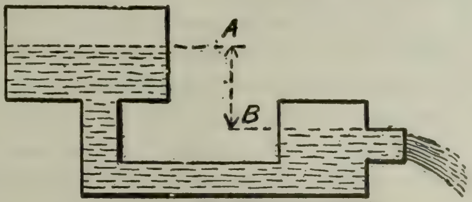
All molecular disturbances give rise to disturbances of electrical equilibrium. We notice the result only when the conditions are such that the equilibrium is not too easily re-established.

Electricity is termed positive (+) when it has an accumulation of electrical force to impart; negative (—) when it will require such an amount of electrical energy to restore the electrical equilibrium. The difference of electrical conditions is termed the difference of potential.

Difference of potential is a difference of electrical conditions, by virtue of which work is done by the electrical vibrations in moving from the point of higher to that of a lower potential, and is measured by the unit of quantity of electricity thus transmitted.

The passage of electricity from the point of higher to that of lower potential is termed electrical current, and the bodies along which it passes are conductors. The opposition to the passage of the current is termed the resistance.

The action of the electric current may be illustrated by two reservoirs of water connected by a pipe. The electric current is represented by the flow of water through this pipe from the higher to the lower level. The unit of current strength, also called the rate of flow or intensity, is the ampère. In the illustration we would say the water is flowing through the pipe at the rate of one gallon per second. In



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speaking of the electric current, we would say it has a strength of, say one ampère.

The unit of electro-motive force, also called electrical pressure, or tension, or difference of potential, is the volt. In the illustration the head of water, or the difference between the levels A and B, is similar to the electro-motive force.

The unit of resistance is the ohm. Resistance may be compared to the friction offered to the water by the internal surface of the pipe.

Conductors are good or bad as they favor or resist the passage of the electrical current; different metals vary in their conductivity, silver and copper being high in the scale, while German silver and steel retard the current. Moisture is a good conductor, while glass, kerite, rubber, and dry air are among the poorest conductors; the resistance varies with the length of the circuit, the conductivity and diameter of the conductors,—the larger the conductors, other things being equal, the less the resistance. When the current is too great for the conductor, the wave-length is shortened to that of heat, which varies according to the current and the conductor. The wave-length may be shortened to that of light-vibrations, so that the conductor may glow as in the incandescent lamp or cautery snare.

Frictional electricity is to galvanic electricity what a red-hot needle would be to a large, moderately heated crow-bar; the crow-bar contains more heat than the needle, but one has volume, the other intensity.

Galvanic or voltaic (dynamic) electricity is the particular manifestation of this force most interesting, in a practical way, to the dentist. Batteries consist of positive and negative elements, immersed in an exciting fluid or fluids. The fluid employed varies according to the construction of the battery and the kind of work to be done, being acid or alkaline; though even pure water will generate a current, if two metals, one more readily oxidized than the other, are immersed in it. (Note the fact that action would take place if the elements were composed of two samples of amalgam, one composed of less oxidizable metals than the other.)

The positive element of the battery is the one on which the exciting fluid acts,—that is, the fluid destroys the positive element, molecule by molecule, while the negative element should sustain no loss of structure. If the negative element is acted upon by the fluid, counter-currents are generated which interfere with the usefulness of the battery. In addition to the resistance of the conductors, the fluids of the batteries impose resistance, termed the internal resistance. The electrical energy of a battery is the energy of the current, less the internal resistance and the resistance of the circuit. The resistance, both internal and of the circuit, modifies the action of the battery. If the elements are connected with wire of sufficient size to convey the current, the electro-motive force will be reduced in proportion as the length of the wire is increased or the diameter of the wire reduced; while, if the elements touch in the fluid, the action is most violent and the batteries soon become polarized,—that is, the surface of the elements becomes so changed that the fluid ceases to affect them, or the fluid becomes so saturated with the waste product of the combustion of the positive element that action practically ceases, unless provision is made for it by having the fluid constantly renewed, as in some kinds of batteries designed for constant work.

When the circuit is opened shock is felt, if the current is of sufficient strength, the result of the magnetic energy being suddenly discharged. Different devices are made use of to produce this result, such as the induction coil, constructed with a vibrator, which rapidly makes and breaks the circuit; an example of this is the medical battery and the Ruhmkorff coil; the current produced in this way is called the Faradic.

Now, to apply the foregoing to the battery formed by dissimilar metals in the mouth, where the fluids of the mouth are the exciting media, gold will be the negative element, as the fluids of the mouth have no action on this metal; the positive element is a baser metal, whether used separately, as tin, or, as most commonly in the amalgams for dental use, a combination of mercury with tin, silver, zinc, and copper.

When gold and tin form the voltaic pair the base metal soon becomes coated, and the current practically ceases, but, with amalgam, the mercury performs the same office in the mouth that it does in the laboratory: it presents the metal in a form that is easily acted upon by the exciting fluid.

We always have good conductors in the fluids of the mouth, containing, as they do, mucus and various earthy salts, while often the fillings touch in the same tooth, or as approximal fillings of gold in one tooth, and amalgam in another,—the resistance varying in each case, according to the character of the secretions or the situation of the fillings, and varying also according as the conditions are changed; naturally where food is left between the teeth, to decompose, the acid resulting from such fermentation will form a more exciting medium than normal alkaline saliva. Where a filling is left rough and jagged, overhanging and irritating the gums, it presents an exaggerated surface to be acted upon; besides, by irritating the gums, it causes a secretion from them that forms an excellent exciting fluid. This is, unfortunately, the too frequent result of careless operating.

Dr. Whitefield, in answer to his own question, Are these statements founded on scientific facts? quoted from the *Western Electrician* in reference to a talk he gave before the Chicago Electrical Club, as follows:

"Dr. Whitefield, before the Chicago Electric Club Monday evening, succeeded in settling a question that has been in dispute among dentists as to the electric action of amalgam and gold fillings in the same tooth, or even in the same mouth. That a current was generated by amalgam and gold filling when placed in water, even when they were insulated from each other, was conclusively shown by bringing a galvanometer into circuit. The point is one that may be combated, but the evidence produced by the galvanometer cannot be controverted."

He also quoted from an article on amalgam in the November *Dental Review*, 1887:

"Now the question arises, Shall we ever use amalgam and gold in the same tooth, and if so, why? and if not, why not? There has been such varied teaching in the past in regard to this subject, that it is time the old errors should be exploded and scientific teaching presented to our students of to-day. The old teaching was that amalgam and gold might be placed in the same tooth if it seemed necessary, but should not touch each other or grave results would follow. After seeing such methods pursued for a term of years, we find that in spite of the teachings grave results did follow, which ultimately resulted in the loss of the gold filling, while the amalgam remained comparatively sound, or, rather, the tooth-structure surrounding the amalgam filling."

This is correct; but see the following statements of the same writer:

"We have found that if the two metals touch in the electric battery there is no longer a current, no shock is produced; and it is just the same when the metals are in a tooth in the mouth in the presence of an acid, as it is out of the mouth in the laboratory. Therefore, we found, first from an unpleasant experience, and later from theory, that, if amalgam and gold are placed in the same tooth, they should have an uninterrupted communication, should be in complete apposition, so that no electric or galvanic action can take place because they touch each other."

Let us consider these statements and see if they harmonize with the laws of physics. Now, if the elements (the fillings) touch, there is practically no resistance in the circuit, consequently the battery's action is most violent, up to the capacity of the battery to generate current.

The writer says no shock is produced. He is right; the current flows evenly through the short circuit, so the equipoise is practically maintained, and shock is produced only when the current is interrupted, when an accumulation of energy is suddenly discharged.

Dr. Whitefield said he would endeavor to point out what had misled the writer into making these rash statements.

If gold and amalgam touch in the same tooth, there is practically less destruction around the gold filling. This is easily explained, as the galvanic action is so violent that the surface of the amalgam filling is soon destroyed; that is, all the baser metals are consumed from the face of the plug, leaving the silver, gold, or platinum of which it is composed, on the surface, which practically changes the amalgam to nearly a silver surface, thus raising it to nearly a negative metal; and besides, the coating protects even the surface of the silver.

This statement holds true with regard to very old fillings of amalgam: their surface is no longer amalgam, it is negative metal. But at what fearful cost are such old fillings raised to the dignity of negative elements!

He then noted what he considered some of the harmful phases of the subject:

First, galvanic action has a tendency to accelerate the blood-flow, producing hyperæmia and hyperæsthesia, and in some cases violent nervous phenomena. This is especially the case where, from the situation of the fillings, the energy is accumulated, then suddenly discharged, producing shock, as anyone can demonstrate by touching a bit of zinc or the blade of a penknife to a filling in his own mouth.

Second, the current is generated from all parts of the elements that come in contact with moisture and are not protected by a coating. The portion of the amalgam filling that is protected by tooth-structure becomes so coated that there is practically no action except on its exposed surface; on the contrary, gold remains bright on all its surfaces, and as moisture pervades the whole tooth, no matter how well the filling is inserted, moisture will reach it by way of the intertubular spaces, consequently electrolytic action can take place from all portions of the gold element, naturally causing considerable destruction around the gold filling. Among the commonest elements found in the mouth is chloride of sodium (salt); galvanic action readily breaks up this compound, the chlorine liberates oxygen and unites with the hydrogen of the water, forming hydrochloric acid, leaving the oxygen in its most energetic state. (Other acids may be formed in this way, such as sulphuric, nitric, etc.) The electrolytic action and the acids thus formed are sufficient to so roughen the surface of the teeth as to give lodgment to colonies of microbes.

Moreover, chlorine in its nascent state will readily unite with the mercury of the amalgam, and the chlorides of mercury may be formed in sufficient quantities to produce symptoms of mercurial poisoning in those susceptible to its influences; these salts of mercury may also explain the immunity from decay of teeth stopped with ill-fitting amalgam fillings, the germicidal effects of the mercury being sufficient to prevent colonization of micro-organisms, and consequent destruction of the tooth.

The oxygen might, from peculiarities of the individual case, unite with other salts than those of the teeth, and the same with the acids. We all know that the neglect which some mouths bear would entail total destruction in others. The elements that usually produce decay seem to be inert in their case, and the same condition undoubtedly explains why electrolytic action that would destroy in one case is apparently harmless in others, although such cases are in the minority.

The usual result of placing amalgam in the back teeth, while gold is placed in the front teeth, of children, will explain why the gold fillings have to be renewed so often ; also, that in the electrical action is a clue to the oft-repeated tale brought us by the laity that amalgam stands better than gold, as the amalgam still remains, and the gold fillings, that have been replaced several times, are loose again.

If amalgam must be used, use those grades that will readily become coated, as the coating will reduce the galvanic action, protecting the filling from the fluids of the mouth, except where attrition and brushing keep them bright. Gold and amalgam, in fact any metal, should be avoided for teeth that are of such soft structure that the pressure required in inserting a metal filling would tend to break down the tubuli. Metals never stand well in teeth of very soft structure. You might as well expect to prevent water flowing under the edge of a board resting on the ends of cedar blocks in a street pavement as to expect to exclude moisture from a soft tooth with a metallic filling, as moisture is bound to penetrate between the tubuli. Even the normal plasma exuding from the tubuli will have a tendency to assist the destruction of the hard structure when it becomes vitiated, as it must at the temperature of the mouth, as it is as foreign a substance when lost from the tubuli as is the blood that weeps from abraded gum-tissue.

The cements and gutta-percha are the only filling-materials that should be used in such teeth. If you use these materials, in the course of eighteen months or two years the tooth will be quite hard and capable of proper manipulation to prepare it for filling with gold.

After reading the paper, Dr. Whitefield showed, by means of a galvanometer, the action of the fluids of the mouth upon a gold and an amalgam filling inserted in a piece of ivory and connected with the galvanometer by wires. When the piece of ivory was inserted in ordinary hydrant-water, the needle of the galvanometer was deflected to ten degrees on the gauge ; when it was placed in the mouth, it indicated instantly thirty degrees ; and when a piece of pickle was placed in the mouth with it, the needle instantly moved as far as it could go, thus showing that with two dissimilar fillings in a mouth which was absolutely neutral there would be weak galvanic action constantly, while in ordinary cases there would be three times as much, and in the presence of an acid condition the action would be quite enough to certainly decompose the baser metal.

Discussion.

Dr. J. L. Williams said he was glad to see the conclusions already reached by the majority of dentists demonstrated by scientific instruments. This was frequently the course with discoveries ; they were made first and then proven afterward. For instance, it had been known for years that it was necessary to use antiseptic medicines for the prevention of caries of the teeth before it was shown that caries was caused by the action of microbes. He had noticed that galvanic action was more likely to occur when the amalgam used contained zinc. Where galvanic action was feared, it could be prevented, or at least greatly lessened, by combining gold foil with the amalgam and thus making the amalgam more similar to the gold filling.

Dr. Marshall said that the galvanic action between two dissimilar fillings had been demonstrated by Dr. Palmer, of Syracuse, fifteen years ago, and also that there was galvanic action between different kinds of food. He thought this action was what gave particular zest to such foods when eaten together, and instanced such foods as turkey with cranberry sauce, fish with lemon-juice, and mutton with mint sauce, as provoking such action. He thought, too, that the particular relish the English find in beer comes from the fact that they drink it from pewter mugs, and the pewter caused galvanic action pleasant to the nerves of taste. In the case, however, of fillings, when an amalgam filling is placed in contact with a gold filling the amalgam will soon become coated, and then all action ceases.

Dr. Whitefield said that the galvanic action would recur in case the amalgam filling should be polished up after it had become coated, and that the galvanic action would cause the tooth-substance about the gold filling to disintegrate and thus make the gold fillings loose. He thought the use of either amalgam or gold was contra-indicated in soft teeth. By the use of a phosphate filling such teeth would be improved ; they would become more dense, when, if necessary, the cement could be removed and a gold filling inserted. In case gold were added to amalgam, it would be better to add it in the shape of a piece of gold wire or small screw, as, if it were added as foil, the foil would be amalgamated and the object would be defeated.

(To be continued.)

CHICAGO DENTAL CLUB.

(REPORTED BY C. STODDARD SMITH, D.D.S.)

THE regular monthly meeting of the Chicago Dental Club was held at the Tremont House, April 27, 1891. The meeting was called to order by the president, Dr. A. B. Clark.

The special committee on publication reported a proposition from the editor of the DENTAL COSMOS to publish the proceedings of the club, which was adopted.

Dr. C. R. Baker read the following paper on

THE USE OF METALS AS FILLING-MATERIALS.

Education seems to be, and rightly so, the foremost thought in the dental profession to-day, and I desire to present to you some thoughts in regard to education respecting the use of metals as filling-materials.

The education of a student in our colleges, so far as I am acquainted with them, with regard to the nature of the materials we use for fillings is sadly neglected, and in very few cases is this neglect ever overcome in after-life. How many dentists can tell the composition of the amalgams they use, or even the desirable qualities in an amalgam? They may know in an indefinite way whether or not an amalgam gives satisfaction, but if it does or does not they cannot give the reason or the property lacking or possessed, and many there are who will go on year after year filling and refilling teeth with the same material without searching for the cause of failure or success. If we were answerable to the law for our lack of knowledge of the composition of the materials we use, how many of us might be adjudged guilty!

In the use of filling-materials, amalgams for instance, every dentist should learn as the first principles of his education the properties required, and what metals, and what proportions of those metals in an amalgam alloy, give these properties.

I say the education of the student in our colleges is neglected in this line. It may not be altogether the fault of the lecturer, for a student should be expected to learn more than the lecturer may state. No student's course can be completed without the use of text-books, and their possession and use, I think, should be more stringently insisted upon. The properties of gold and other metals, even though continually in use, cannot be fully understood without the use of a text-book, and no dental student should be allowed to go through a course without the use of some such book as Essig's "Dental Metallurgy," Flagg's "Plastics and Plastic Filling," and Mitchell's "Dental Chemistry." I believe there are many dentists who during the time they have been in practice have not read a book a year on the subject of dentistry. Can a man be one of a learned profession and not read or study? Is it possible for us to claim for dentistry equality with the learned professions under such circumstances? The idea that books are a necessity should be instilled into the minds of students; a man should properly prepare himself for his life's occupation, otherwise he does an injustice not only to himself, but to mankind.

Taking for our standard what is required of a professional man according to the law,—viz, knowledge, skill, and care equal to the average,—we may be acknowledged as legally worthy, according to this standard, but there is a higher standard to which we are answerable. If we have ability which exceeds the average, we are morally as much bound to develop that ability to its fullest extent as one who has less ability is bound to develop that until it reaches the average.

A short paper on the use of metals for filling purposes can be but superficial in its character, and only a few points can be spoken of. These metals must possess properties which are very difficult to obtain in one metal or alloy, and we can say without hesitation that the ideal filling-material is very little nearer our reach than it was many years ago. The great advance in dentistry has not been in the improvements in the materials used, but in the methods and instruments used in their manipulation. The use of cohesive gold was not so much a change of material, but of the method of using it. The rubber-dam, the dental engine, the electric and other motors, the various mallets, and many other beautiful and useful inventions, together with the higher education resulting in the more skillful and scientific use of medicaments, are what have raised dentistry to its present standard. But to-day the dentist is filling teeth with very nearly the same materials that were used ten, fifteen, yes, twenty years ago.

There have been but few changes. Many of the so-called or advertised differences are not differences at all, or the difference is so slight that it cannot be worthy of regard. Thus with amalgam or gold we are led to believe that the latest arrival is an improvement on the old, and we take it up for no other reason; but we must have a care lest we are carried away by the desire for something new. I do not say this in a derogatory way, for I believe that there is no man or class of men that should be more particular about little things than the dentist. The little points that are neglected are the points where failure has its inception.

Again, when, after years of experience, we are thoroughly convinced that a certain thing is good, we often sadly neglect its use, and I know not why. To give an example from my own many failings: I believe that the use of tin under gold at the cervical margins of approximal fillings is an excellent thing, and I say this because of the good results observed in my own work after several years of use, and comparison of other kinds of fillings under as near the same circumstances as possible. Yet I must confess that I neglect the use of tin in this way in many places where I have no doubt of its efficacy, either because it is a little more trouble to use the different materials in the same cavity, or it may be a neglect without a defined cause.

Different alloys are used and worked by many as if they were elements, without regard to their composition, and if a desirable property is possessed by a certain alloy we do not try to find what it is that gives that property. The man who is always trying to find the why is the man who is advancing. What we want in our profession is men who are noting and utilizing the valuable qualities and good effects of all materials.

The principal property of a filling-material, and the one which stands out as the essential property above all others, is easy and perfect adaptability to the cavity. But almost simultaneously with this we must mention three other properties,—non-conducting power, durability, and natural appearance. Any filling that would possess a combination of these properties to even a slightly greater extent would bring us one step nearer to the ever-sought ideal filling.

We have come to look upon the metals as so largely satisfying our wants, and their use has become so universal, that we might say that this age of the world is a metallic age, and we as dentists have come to confine ourselves almost entirely to their use. Ever since the first tooth was stopped by biting a piece of soft metal into it, ever since the first use of gold for dental purposes, three hundred years before the Christian era, metals have been thus used. It was the desire for a filling that was more easily adapted to the walls of a cavity that led to the use of amalgams, of cements, and all plastics. I believe that but for the desire for this one property of adaptability very little if any other material than gold would ever have been used.

Little need be said as to the conducting power of the metals, for we all recognize the value of a filling of low conducting power. I think too much dependence is placed on the use of cements and gutta-percha, for their low conductivity. Not that they are used too much, but that the use of a metal of low conducting power in filling the body of the cavity is neglected.

One of the greatest advantages in the use of tin is its low conducting power. As a rule, alloys have a lower conducting power than their constituents. From this we might think that an amalgam would possess a comparatively low conducting power, but I believe the large amount of silver (which is the best of all conductors) makes a dental amalgam almost if not quite as good a conductor as gold. One property of non-cohesive gold is its comparatively low conducting power, which is dependent, according to one theory, on the condensation of gases on its surface, gases being the poorest conductors of heat and electricity.

Metals are the best conductors of heat, and when we find it necessary to use them in replacing tooth-substance, which is a very poor conductor, our work is at a great disadvantage. Their conductivity, as well as lack of harmony in appearance with tooth-structure, places metals far from what is desired as an ideal filling-material.

Natural appearance is one of the most desirable properties in a filling-material, and it is a property which has so far been unattained. The best and most beautiful fillings (most beautiful as to workmanship, etc.) are a disfigurement.

A necessary property of all metals is what is known as metallic lustre, which is believed to depend on their perfect opacity, and this one property, regardless of color, makes metals inharmonious with tooth-substance. Thus in many of the properties desirable in a filling-material metals are sadly lacking. Amalgams may present a somewhat better appearance at first than other metallic fillings, but their usefulness depends to a great extent on the deposition of salts, which discolor the tooth as well as the filling. They are good conductors, but the only easily adaptable filling of metal.

Tin may be classed with amalgams as to appearance. It is a poorer conductor, less adaptable, but too soft for general use.

Gold we may class as much better in appearance, above amalgam in conducting power, but much less adaptable than either amalgam or tin.

Gold and platinum combined answers more of the requirements than any of the other metals in use. It is a much poorer conductor (with the exception of tin), and far surpasses all metallic fillings in appearance, but its lack of adaptability places it beyond the possibility of use, excepting in a very few places.

Thus we must either sacrifice convenience of manipulation and adaptation for beauty of appearance, or *vice versa*. Neither amalgam, gold, nor any metal is a satisfactory substitute for tooth-substance. From this we must decide that the filling-material of the future will not be a metal.

Without a doubt dentistry has advanced more than any other profession in the last twenty years. Since the time when it was too young to be worthy the name of a trade until the present, the great drawback has been the want of a suitable material for replacing tooth-substance. I may say this is being overcome to a certain extent. When crown-work was introduced, dentistry took a great step upward, and bridge- and inlay-work have taken us still farther in the right direction. When we can replace a tooth or a part of a tooth with porcelain in such a way that the casual observer cannot recognize the difference between the artificial and the natural, then metals will have very little use in dentistry as substitutes for tooth-substance.

Discussion.

Dr. W. W. Allport. I find that the use of tin in connection with gold—that is, combined with gold in equal parts, keeping the tin upon the outside—gives satisfactory results. As long as the tin preserves its integrity it will preserve the tooth. Chemists tell us that the sulphide of tin is formed, and being an antiseptic is desirable for that reason. If there be any imperfections in the adaptation to the walls, the deposit of sulphide of tin makes up for them.

It makes little difference what the filling-material is, so long as the filling lasts and it preserves the tooth.

Non-cohesive foil has advantages over cohesive foil, and is more desirable for a filling-material. Non-cohesive foil does not transmit thermal changes as readily as cohesive foil, from the fact that the pieces are not welded. Each piece is separate. There is no cohesion of particles, therefore conductivity is greatly lessened. Moderately contoured fillings can be made with non-cohesive foil by the use of wedge-shaped serrated pluggers and forcing the last pieces into the already condensed filling. This was frequently done by our old operators before crystal or cohesive foils were known; but it is not an easy thing to do. The use of cohesive foil makes the operation much more easy and the durability more certain than it can be by the use of non-cohesive gold exclusively. The interior of the cavity should be filled with non-cohesive gold and finished with cohesive. Nine-tenths of cohesive foil fillings leak. The dentists of to-day are brought up on cohesive gold, and it is not an exaggerated statement when I say two-fifths of them are failures.

Dr. J. S. Marshall. Having practiced in Central New York for many years, I have had the opportunity to see and examine many of the fillings inserted by Dr. Westcott. I have removed some of his fillings of non-cohesive foil that had begun to give out after years of service, and have taken them apart piece by piece as one would bricks in a wall. Cohesive foil fillings could not be treated in that way. I have seen operations of Dwinelle and others, after a service of forty years, inserted with hand-pressure and napkin, and still perfect.

Dr. E. A. Royce. We should take into consideration the character of the teeth operated upon then and those operated upon to-day, and the method of treating badly diseased teeth. Teeth which were formerly filled were usually teeth of good structure, and the badly decayed ones were removed. I enjoy the operation of building with non-cohesive foil, but I can make a more satisfactory filling with cohesive foil. It makes a more satisfactory surface.

Dr. A. E. Baldwin. While at college I heard nothing at all of non-cohesive gold, and naturally fell to using what the large majority of others did. Dr. Allport was the first one to teach me the use of non-cohesive foil, and I now use it in contact with the wall almost exclusively. I also use a great deal of tin and gold to my own satisfaction. I recommend my patients to have fissure-cavities filled with tin in preference to any other material. They are put in easily and quickly, and are almost free from thermal changes. It is true they discolor, but they stand the force of mastication. The idea to preserve the teeth with as little mutilation as possible should be the governing one.

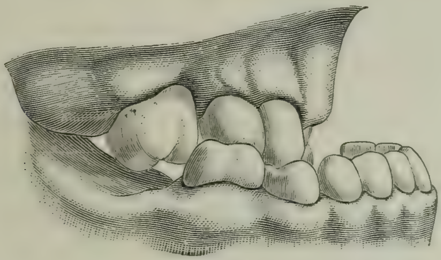
Dr. Baker. The salts of tin and gold are antiseptic, so are the salts of copper. I believe that if there be any galvanic action between different materials in fillings it is deleterious. As regards cohesive gold, probably all good operators use non-cohesive gold for foundations and in contact with the walls.

Dr. A. E. Matteson presented a case of dental deformity with his mechanical device for its correction, as follows:

Mr. President, I wish to present a patient for whom I have recently inserted a novel denture, the results of which are very satisfactory both to the patient and operator. The difficulties encountered cannot be fully appreciated without an examination of the cast of the case, made before the denture was inserted.

By referring to the cast you will observe an excessive protrusion of the inferior jaw, a lack of development of the superior, loss of the four incisors, right cuspid, left second bicuspid, and first molar. You will also observe that the outer cusps of the cuspid and bicuspid occlude inside the outer cusps of the lower bicuspids; also that the superior cuspid articulates on a line with the inferior second bicuspid.

FIG. 1.



Upon looking into the mouth on a line with the articulating surfaces of the lower teeth, when the jaws are closed, the upper teeth show but about one-half their length, while the lower central incisors are fully one-half an inch anterior to the gum of the upper jaw, where the incisors are missing. (Fig. 1.)

The management of the case was as follows: A plate was made covering the ends of the remaining four superior anterior teeth, which demonstrated that the appearance of the face would be greatly improved by lengthening the bite. It was adjusted by cutting away until found to be comfortable. These teeth were then built up with hard wax to that distance and carved in contour. The cuspid was covered in front as well as lengthened until the end articulated with the inferior teeth. Impressions of these were taken in plaster and filled with "Melotte metal," the same also with the right molar. For the latter a crown of gold and platinum plate was made which covered it entirely, its shape being favorable.

Patterns for the shells of the bicuspids on the right side and cuspid and bicuspid on the left were made of No. 60 tin foil by burnishing over the metal dies, cutting out the faces of the bicuspids, but covering the cuspid where the tooth had been covered with wax. These caps were made of one piece by slipping it between the teeth and forming it around like the letter S, with its ends soldered (Fig. 2). As some spring to the shell was required, coin gold No. 27 was selected as the best material. These were made, adjusted, and articulated, and an impression taken with them in the mouth. They were then removed and invested in plaster and sand. A "Bing" tooth was adjusted and soldered to the shells between molar and bicuspid. (Fig. 3.)

FIG. 2.

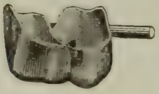
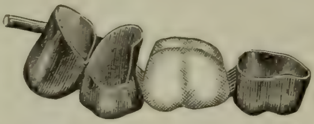


FIG. 3.

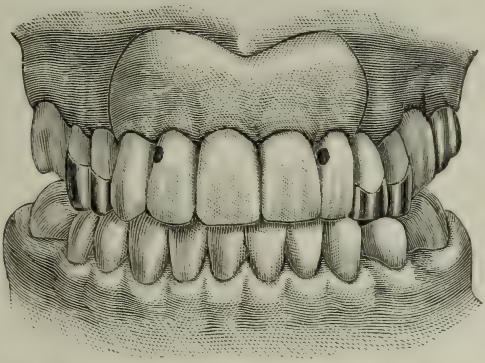


By closely inspecting the cast you will notice that these side-teeth are twisted, and stand in such positions that a cap could not be passed over the ends; but by passing the shell sideways, allowing the teeth to pass through the opening, it could then be placed in position.

On each lingual side of the shells, near to and parallel with the gum, two wires (iridiumized platinum), No. 14, were fitted and soldered. These wires extended a quarter of an inch beyond the shells, forming horns (Figs. 2 and 3). Over these horns platinum tubes were fitted, and an impression taken with the fixture in position, the tubes in place, but only including the front of the teeth and the gum under the lip, and only on a line of the gum ridge and parallel with the horns, thus permitting the removal of the impression by drawing it outward, and the removal of the tubes from the horns with the impression. The fixtures were again removed and the impression just taken replaced on the fixtures, and a cast of the fixtures and impression was made, the bite having been previously obtained.

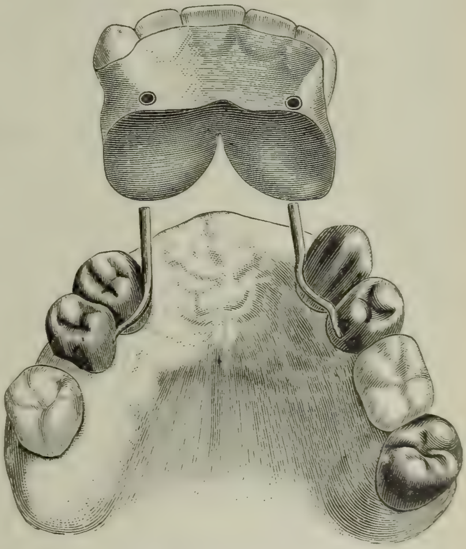
Teeth were ground and arranged, making a square bite. The ends of the tubes were passed between the artificial cuspid and lateral on the right side and the lateral and central on the left side. The end of each tube was conformed to the outline, and the opening closed with pure gold, presenting the appearance of an approximal gold filling. (Fig. 4.)

FIG. 4.



To preserve the parallel position of the two tubes the rubber plate was vulcanized with the fixtures, the horns holding them in that position. After vulcanizing, the plate was separated from the fixtures and finished. The fixtures were cemented on the teeth with gutta-percha.

FIG. 5.



The novelty of the attachment of this removable bridge consists in its bearings (the piers or bearings being the two parallel bars or horns), the insertion and removal being at right angles with the line of axis of the teeth instead of parallel, and the application of the fixed crowns, without grinding or in any way changing the shape of the natural teeth. (Fig. 5.)

Discussion.

Dr. E. S. Talbot. Dr. Matteson has invented and presented to us this evening a very valuable method of correcting one of the most difficult cases of deformity with which we have to contend. I can readily comprehend the advantage in this method of treatment, which, however, he has not fully explained. In the first place, this deformity of the jaws is always due to one or two conditions which have their origin in constitutional disturbances. There is either an excessive development of the rami or body of the lower jaw with a normal upper jaw, or there is arrest of development of the upper jaw with a normal lower jaw; in either case the lower jaw protrudes. If the upper jaw is arrested in its development, we find in most cases that the lip is shortened also. When the ordinary plate is inserted, unless it is clasped to the bicuspids or molars, there is a tendency for the plate to tip down into the mouth when the patient bites. In this case the plate in the roof of the mouth is avoided, as well as the annoyance of the plate dropping into the mouth. Again, if the lip is short, or if the lower jaw and teeth protrude to any great extent, the rubber gum may still be made so very thin that the lip will not protrude, and the teeth may be so arranged as to articulate nearly, if not quite, with those upon the lower jaw. This method might also be used when the cuspids and bicuspids are missing on one or both sides; those teeth which still remain in the mouth furnishing the support for the artificial ones. The gum and gingival margin offering a support to the plates in the anterior part of the mouth, the vault of the mouth is relieved of the presence of all foreign substance. This method of procedure seems to me to mark a new era in the treatment of this variety of deformities.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Concluded from page 584.)

SECOND DAY.

DR. C. N. PEIRCE, of Philadelphia, read a paper on "Secondary Dentine." He was followed by Dr. Frank Abbott, of New York, whose paper, entitled "Congenital Defects in Enamel," will be found on page 605 of the current number.

Dr. W. C. Barrett. I wish to say a few words of praise for a paper of this kind. It is a subject of which we are anxious to know all we can. It is in the line of the higher development of dentistry, and everybody who is interested in the scientific aspect of our profession should consider it.

There was a case that came into my office which has been a puzzle to me ever since, in which the roots were well developed, but there was no crown to the tooth at all: there was just an edge around the margin of the gum. It was a singular fact that this was a peculiarity which had been inherited from the person's ancestors, as far as I could trace the case, for generations back. There were six in the family, yet there was only one who had inherited it from his father, and in his father's generation it had occurred in a lateral branch. It is a stalagmitic and stalactitic appearance of the enamel. You are familiar with the condition of dentine underneath it. I think it is a subject that should be followed up, if possible, to the cause. That it is not due to disease was apparent, but investigation might show the whole history of this peculiar condition.

What I particularly desired to say was, that such a paper as this and other papers which have been read at this meeting should be placed before the whole profession ; we want to read them and study them and think of them while they are fresh. If kept for a year they become stale.

The President. I understand that arrangements have been made to publish the papers in full, just as rapidly as they can be published, in the DENTAL COSMOS.

Dr. John I. Hart. There was one point illustrated by Dr. Abbott that was very satisfactory to me, as it tended to confirm some recent studies that I have made with the microscope ; that was, the very conclusive reasons that were shown by a study of the indications at the junction of the dentine and the enamel ; of the amount of living matter and the extreme sensibility at that point. One would think that the large proportion of living matter at that point would tend to weaken the tooth,—certainly when attacked there it goes more rapidly than at any other ; from a practical stand-point, in using our burs, we realize how extremely sensitive all teeth are at that point, and under the microscope the cause of the sensibility there is shown distinctly. I think what impressed me more than anything that was shown was the sudden lack of nutrition of the mother while she was carrying the fœtus, and the lack of development that was the result. In our practice we are familiar with the fact that either through a lack of nutrition, or disease, or shock, development has been suddenly arrested. The specimen shows that very distinctly.

Dr. R. Ottolengui. I do not think the lack of discussion shown here proves that the men have not been making scientific study, but only that they have been studying in other directions, and not in this particular direction. The field has grown so large that it has been divided up into a number of branches or specialties, and each man takes interest in his own specialty. I have not been studying in that field, and I am not competent to discuss it, but I have been engaged in practicing dentistry, and it is admitted that what this has brought out is but a well-known explanation of a well-known fact, that the dentine is more sensitive at the marginal point.

There is another fact. Suppose a large cavity in a molar, where the enamel stands, with the exception of the orifice at the top. I have discovered that while it is very sensitive at the point of contact with the enamel, the deeper I cut the more sensitiveness we find at the circumference of the cavity ; the farther we cut from the pulp the more sensitive we find it ; that the nearer we approach the point where there may be said to be a union of the dentine and cementum, the more sensation is found. I have come to the conclusion that it is on account of the larger proportion or amount of soft tissues in comparison to the lime-salts at that place.

Dr. Abbott. My object in this paper more particularly was to arrive at a conclusion in reference to the cause of defective enamel, though not at a particular point, as has just been mentioned. The extreme sensitiveness of the dentine immediately under the enamel, as is well known to medical men and dentists generally, is claimed to be due to some disease or some general depression of the system, which results in a lack of proper nutrition. It seems to me that it is entirely due to local conditions. If there be a general disease or general depression of the system, we would have a deficiency in the formation of the dentine as well as the enamel ; but instead of that we have an inflammation of the mucous membrane lining the mouth, and those little peaks that come down and form the enamel become inflamed as well, and the matter which goes to form the enamel is affected in patches here and there ; a little ulceration takes place, and where it acts to such an extent it will prevent the deposit of lime-salts proper. It becomes defective in places by the shutting off and destruction here and there of the blood-vessels. If it were general instead of local, we would have trouble in the dentine itself.

Now, in reference to the sensitiveness under the enamel and upon the surface of the dentine that is exposed, the doctor described a typical case ; the moment you touch it the pain is extreme, and why is it? Because the living portion of that tooth is excessively inflamed ; the same as where you have an acute sore upon the hand, if you cut into it, the deeper you cut the less pain is caused ; the nerves are not pressed upon by the enlarged condition of the blood-vessels. It is the same in a tooth ; we have no blood-vessels, but we have a system of circulation in a tooth ; we have living tissue in a tooth, that becomes as sore and inflamed as any tissue of the body. You touch it and it hurts ; take it lower down and it will hurt less, until when you are near the pulp of the tooth it will not hurt at all. That is the explanation as I understand it.

Dr. W. Jarvie. Dr. Abbott used the term "local,"—that it was "some local condition." Does he mean by that the entire mouth, or some part of the mouth?

Dr. Abbott. It is usually a general stomatitis. It is indicated by a certain stage in the mouth. If you get an acute case of stomatitis, it means that the mucous membrane is involved, that it is all inflamed with all its appendages and all the ducts leading into the permanent teeth as well, and the result is a defect in the enamel.

Dr. Ottolengui. Let me say one word. Drs. Abbott and Jarvie are undoubtedly both correct in saying it is unusual to find this difficulty in a sound tooth in the mouth, and yet in my own mouth there is a lower bicuspid that has defective enamel, in that it has a brown color, and the same tooth in the mouth of my brother and sister has the same defect.

Dr. J. Edward Line, of Rochester, N. Y., read a paper entitled "The Quantitative and Qualitative Rise and Fall of Teeth in their Relation to Work," which is printed in full on page 625 of the current issue.

The President. Dr. Line's paper is now open for discussion.

Dr. Shepard. I have for many years held that it was our duty as practitioners, whenever a sound tooth was lost, to immediately or very soon after supply the deficiency; not to make it a question as to whether it was absolutely necessary for the patient to have it replaced, but as a part of the grand plan of nature, that a given number of teeth are necessary to harmonious arrangement, and therefore the loss of a tooth should be supplied for the benefit of the remaining teeth as well as for the harmony of the whole. I have carried this idea out in practice to a limited extent, and have been in the habit of replacing lost molars when there was no absolute necessity of so doing for the purpose of mastication, but on the ground that if the original number of teeth had an object the loss of any of them would defeat that object, and art should step in and restore things to the normal condition.

Dr. Curtis. I am deeply interested in the subject of the paper; it is a subject all should consider more carefully than has been done. When nature has no use for a tooth, she throws it out. Now, when the system is so debilitated that it does not require food, and teeth are of no further use, we should consider the physical condition of the patient, and refer him to a physician and have the health restored. As a rule, our patients are too poorly fed; they have plenty of food to grind, but not the inclination to grind.

Dr. Barrett. I must dissent from Dr. Curtis when he says that nature removes a tooth because it has no use for it.

Dr. A. H. Brockway. Either Dr. Shepard or myself has misunderstood the purport of Dr. Line's paper. Dr. Shepard says he often supplies teeth when there is no other reason for it than the belief that nature had put them there for an object. If I understand Dr. Line correctly, he regards that as bad practice, because where artificial teeth were supplied the injury to the remaining ones was indisputable, and was attributed to the clasps and bands by which the artificial teeth were sustained; while the inference is, that the loss of the teeth is simply because the work is taken from the natural teeth and given to the artificial teeth.

Dr. Line. At the time my intention was to refer to deeper considerations that come under the head of sexual characteristics and temperaments.

HARVARD DENTAL ALUMNI ASSOCIATION.

THE twentieth annual meeting of the Harvard Dental Alumni Association was held at "The Thorndike," Boston, Mass., June 23, 1891.

At the business meeting a permanent organization was effected, under the name of "The Harvard Dental School Association." A constitution was adopted which provides that all graduates of the school, members of the board of instruction, and others holding the Harvard dental degree may become members. The initiation fee was fixed at two dollars, with annual dues thereafter of three dollars. Twenty-five dollars in one payment confers life membership, with relief from dues thereafter. The annual meetings are to be held at Boston on the Monday preceding the annual commencement of Harvard University. The council, consisting of the officers of the association, have power to appoint corresponding secretaries in cities and towns of the United States and foreign countries, whose duty it shall be to promote the association's interests in their localities.

The following officers were elected: James A. Reilly, president; George H. Ames, vice-president; Charles H. Taft, Cambridge, Mass., secretary; W. E. Page, treasurer; W. P. Cooke, F. A. Banfield, and Charles H. Taft, executive committee.

NEW HAMPSHIRE DENTAL SOCIETY.

THE fifteenth annual meeting of the New Hampshire Dental Society was held in Concord, N. H., June 15 to 17, 1891.

The following officers were elected for the ensuing year: W. R. Blackstone, Manchester, president; C. P. Webster, Franklin Falls, vice-president; G. A. Young, Concord, treasurer; B. C. Russell, Keene, secretary; G. A. Bowers, Nashua, librarian; J. H. French, of Penacook, E. C. Blaisdell, of Portsmouth, and E. B. Davis, of Concord, executive council.

It was voted to hold a special meeting of the society at Manchester, September 30 to October 2, and all members of the profession are cordially invited to attend. Efforts are being made to make it the largest and most profitable meeting of dentists ever held in the State.

B. C. Russell, *Secretary*, Keene, N. H.

COLORADO STATE DENTAL ASSOCIATION.

The Colorado State Dental Association held its fifth annual meeting at Denver, on June 2, 3, 4, 1891. The society passed resolutions of regret concerning the death of Drs. W. H. Atkinson and James W. White.

The following officers were elected: R. B. Weiser, Georgetown, president; D. Murray, Greeley, first vice-president; S. Davis, Denver, second vice-president; W. A. Smith, Salida, secretary; Mrs. F. P. Corbet, corresponding secretary; Wm. Smedley, treasurer.

The place of next annual meeting will be Colorado Springs.

POST-GRADUATE DENTAL ASSOCIATION OF THE UNITED STATES.

The annual meeting of the Post-Graduate Dental Association of the United States was held at the Leland Hotel, Chicago, June 24, 1891; Dr. G. H. Cushing, president, in the chair.

Officers elected for the ensuing year are as follows: Dr. R. B. Tuller, Chicago, president; Drs. Levi S. Keagle, Vinton, Ia., A. P. Nicholson, Edgerton, Wis., and M. R. Julian, Lafayette, Ind., vice-presidents; Dr. L. S. Tenney, Chicago, secretary and treasurer.

This organization has just completed the second year of its existence. Its objects are mainly to establish a systematic course of home study, and measures are now on foot to begin this work during the year.

Those desiring further information should address the secretary, Dr. L. S. Tenney, 96 State street, Chicago.

INDIANA STATE DENTAL ASSOCIATION.

The thirty-third annual meeting of the Indiana State Dental Association was held at Indianapolis, June 30, 1891.

The following officers were elected for the ensuing year: E. J. Church, La Porte, president; R. W. Van Valzah, Terre Haute, vice-president; G. E. Hunt, Indianapolis, secretary; Merit Wells, Indianapolis, treasurer.

The next meeting will be held at Lake Maxinkukee, Ind., commencing on the last Tuesday in June, 1892.

G. E. Hunt, *Secretary*, Indianapolis, Ind.

VIRGINIA STATE DENTAL ASSOCIATION.

THE twenty-second annual meeting of the Virginia State Dental Association will be held at the Hygeia Hotel, Fortress Monroe, beginning August 18, 1891, at nine o'clock A.M.

All members of the profession are cordially invited to attend, and will receive a hearty welcome.

J. HALL MOORE, *Cor. Secretary.*

The State Board of Dental Examiners will meet at the same time and place, to examine candidates for the practice of dentistry in Virginia. None but graduates are entitled to examination.

W. E. NORRIS, *Secretary.*

NEW HAMPSHIRE BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the New Hampshire Board of Registration in Dentistry will be held in Concord, September 1 and 2, 1891, for the purpose of examining those who desire to practice in the State who were not in actual practice April 7, 1891.

Those who intend to come before the board will please notify the secretary as soon as possible.

EDWARD B. DAVIS, *Secretary*, Concord, N. H.

DENTAL COLLEGE COMMENCEMENTS.

COLLEGE OF DENTISTRY OF THE UNIVERSITY OF MINNESOTA.

THE annual commencement exercises of the College of Dentistry of the University of Minnesota took place at the Coliseum, Minneapolis, Minn., on Thursday, June 4, 1891.

The annual address was delivered by Cyrus Northrop, LL.D., president of the university.

The number of matriculates for the session was thirty-seven.

The degree of D.D.S. was conferred on the following graduates by President Northrop:

NAME.	STATE.	NAME.	STATE.
Henry T. Breck	Minnesota.	Louis W. Meckstroth	Minnesota.
Ella Z. Chandler	Minnesota.	Edwin G. Riddell	Minnesota.
Fred. Augustus Lenox	Minnesota.	Frank C. Todd	Minnesota.
Edgar H. Marshall	Minnesota.		

COLLEGE OF DENTISTRY OF THE UNIVERSITY OF MICHIGAN.

THE commencement exercises of the College of Dentistry of the University of Michigan were held, in connection with those of the other departments of the university, at Ann Arbor, Mich., Thursday, June 25, 1891.

The commencement oration was delivered by Daniel C. Gilman, LL.D., and the degree of D.D.S. was conferred upon the following twenty-nine graduates :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Walter H. Booth	Michigan.	Pascal P. Nelson	Michigan.
James F. Cook	Ohio.	Charles S. R. Osius	Michigan.
M. V. del Valle	Porto Rico.	Michael M. Park	Ontario.
Rokus C. Devries	Michigan.	Wilsie D. Reed	Michigan.
Arthur A. Deyoe	Michigan.	Clinton R. Scott	Michigan.
Frank C. Dorrance.	Michigan.	Alfred L. Sickler.	Michigan.
Chas. H. Edwards.	Michigan.	Charles P. Stone	Michigan.
Fred. W. Fleming.	Iowa.	Jonathan R. Taft	Ohio.
Walter J. Green	Michigan.	Lewis C. Thayer	Michigan.
Frank S. Henry	Florida.	Victor E. Tuttle	Michigan.
Wm. E. Kearns	Michigan.	Eldon Waterloo	Michigan.
Gordon G. McCoy.	Ohio.	Lucy K. Waterloo	Michigan.
Austin McGuire	Michigan.	William Williams, M.D	England.
Clinton F. Metcalf.	Washington, D. C.	Burt G. Winans	Michigan.
Arthur W. Mueller.	Wisconsin.		

HARVARD UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Harvard University were held in Sardus Hall, Cambridge, Mass., in connection with those of the other schools of that institution, on Wednesday, June 24, 1891.

The number of matriculates for the session was forty-four.

The degree of D.M.D. (Dentariæ Medicinæ Doctor) was conferred on the following graduates by Charles William Eliot, LL.D., president of the university :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Paul Boitel	Switzerland.	Clarence M. Noble	Canada.
Georges A. Brouillet	France.	Hugh Owen	New Zealand.
Alexander H. Fisher	Massachusetts.	Joseph T. Paul	Massachusetts.
A.A.Goldsmith, D.D.S.	N. Hampshire.	Henry R. Peach	Massachusetts.
Amos I. Hadley	Massachusetts.	George B. Perry	Illinois.
George M. Holden	Massachusetts.	Wm. T. Sharp, D.D.S.	California.
Shimpei N. Isawa	Japan.	Fred. H. Woodcock	Massachusetts.
George Martin, D.D.S	California.		

BOSTON DENTAL COLLEGE.

THE twenty-third annual commencement of the Boston Dental College was held at Berkeley Temple, Boston, Mass., on Wednesday, June 17, 1891, at 7.30 P.M.

An address was delivered by Rev. E. L. Rexford, and the valedictory by George A. Thatcher, D.D.S.

The number of matriculates for the session was ninety-six.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college :

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Fred. W. Barbour	New Brunswick.	Wm. E. Nickerson	New York.
Frederic S. Belyea	Massachusetts.	Ernest P. Peake	South Africa.
John B. Chandler	Massachusetts.	Oliver Pease	Massachusetts.
John W. Emmerson	Massachusetts.	Walter H. Pierce	New Hampshire.
Edmund J. Ferry	Massachusetts.	Mark W. Pray	Massachusetts.
Frank E. Follett	Maine.	John S. Scott	Canada.
William E. French	Massachusetts.	Henry K. Shatswell	Massachusetts.
Jennie H. Gallup	Rhode Island.	George A. Thatcher	Massachusetts.
True A. Hoadley	Vermont.	Benj. H. Thornton	Massachusetts.
Kristian H. E. Hoeg	Rhode Island.	Sherman E. Vinton	Rhode Island.
Frank B. Johnston	Massachusetts.	Asaph J. Walker	Maine.
Chas. W. Lacaillard	Massachusetts.	Clarence H. Walls	Massachusetts.
William A. Lesure	Massachusetts.	Edwin D. Wood	New Brunswick.
Knut J. Lüttropp	Massachusetts.	Austin W. Woodman	New Hampshire.
Frederic W. Lyons	Massachusetts.	Marion L. Woodward	France.
Jos. T. McGovern	Massachusetts.		

LOUISVILLE COLLEGE OF DENTISTRY.

THE annual commencement exercises of the Louisville College of Dentistry (Dental Department of the Central University of Kentucky) were held at Macauley's Theater, Louisville, Ky., on Wednesday evening, June 17, 1891.

The valedictory on behalf of the graduating class was delivered by John D. Grant, D.D.S., and short addresses were delivered by Professors J. Lewis Howe and Francis Peabody.

The degree of D.D.S. was conferred on the following graduates by Rev. L. H. Blanton, D.D., chancellor of the university :

Otto B. Bachman.
William J. Botkin.
H. E. Cottingham.
George M. Dayton, M.D.
John C. Giltner.
Percy E. DeMille.
John T. Grant.
James P. Gray.
August W. Gruebbel, Jr.
David S. Henry.
Elhanan M. Hight.
Abraham Howe, Jr.
James M. Johnston.
C. M. MacDonald.
Thaddeus J. J. Meder.
Benjamin T. Messick.
James B. Moore.
Charles Park Peters.
Chas. W. Potter.
Wm. S. Rogers.
Thomas B. Sanders.
Charles H. Sharp.
Chas. F. Ulmer.
Emmet W. Wagoner.
Daniel W. Whipple.
John H. White.

EDITORIAL.

"HONORARY" DEGREES.

IN a former issue of the DENTAL COSMOS (March, 1881) attention was directed to a circular issued by the Wisconsin Dental College of Delavan, Wis., bearing the signature of its president, offering to confer upon the recipient the honorary degree of D.D.S.; upon acceptance of which offer the concern agreed to "forward by express for $12, C. O. D., a diploma twenty-two by seventeen inches, elaborately engraved on *parchment*, with signatures of the faculty and college seal."

The disreputable character of the institution and its unlawful diploma traffic led to its official denunciation by the State Dental Society and State Board of Examiners of Wisconsin, as well as by the National Association of Examining Boards at their meeting in 1885. The Wisconsin Dental College went out of existence at the death of its president and chief promoter, Dr. George Morrison, which occurred in January, 1886.

The foregoing facts are of interest in connection with a suit recently tried in the Quarter Sessions Court of Philadelphia, where counsel for the defendant sought to put in evidence one of the diplomas issued by the Wisconsin College, and claimed that the possession of this diploma fulfilled the requirements of the act of 1876 of Pennsylvania.

The act of 1876 provides that no person except a regularly authorized physician or surgeon shall practice dentistry, unless he shall have graduated and received a diploma from the faculty of a reputable institution where the specialty is taught, or shall have been examined and received a certificate of ability to practice dentistry from the proper state authorities, or shall have been in continuous practice for three years before the date of the act.

The act of 1883 supplements that statute, and, while leaving the substantial qualifications the same, prescribes a system of registration for more properly authenticating these qualifications.

The act of May 19, 1871, makes it a criminal offense to confer upon any person any degree, *honorary* or otherwise, "upon the payment of money by any person in consideration thereof."

The defendant had presented for record a diploma issued by the Wisconsin Dental College. It was not endorsed by the State Board, and for that reason, as well as for the further reason that the recorder doubted that it was such a diploma as the act contemplated, he refused to record it. The defendant then sought legal advice, and threatened to mandamus the recorder to compel him to record this diploma. His action was promptly reported to the Philadelphia

County Dental Society, who after investigation caused his arrest. Upon the trial of the case, the fact of his practicing was proven and not disputed by the defendant.

The diploma purported on its face to be an honorary diploma, and did not recite that the defendant had pursued any course of study at the institution named ; and it was further admitted by counsel for the defense that he had not attended such a course of instruction.

His honor Judge Willson excluded the diploma, and stated that he would instruct the jury that such an instrument did not fulfill the requirements of the act, which contemplated that the person who had the diploma, and who pretended to have graduated, should have actually undertaken and finished a course of study at the institution which granted it ; and the mere possession of an honorary degree did not fulfill the legal meaning of the term graduated.

The jury returned a verdict of guilty.

We quote from Purdon's Digest of the Statutes of Pennsylvania the following paragraph, which is appended as a foot-note :

"It is difficult to class this, so mean an offense, otherwise than under the head of public nuisances ; the pretender to learning who flaunts such a degree before the eyes of the public is indeed beneath the contempt of every true lover of science. In an indictment for selling a forged diploma, it is not necessary to show an intent to defraud any particular persons ; the general intent to defraud is enough to constitute the offense."

The dental profession, as well as the Philadelphia County Dental Society, are to be congratulated upon the result obtained in this case, which strikes an effective blow at a condition of things which has too long been a blot upon the fair name of American dentistry.

THE ANNUAL MEETINGS.

WHILE official notices of the coming annual meetings of the American and Southern Dental Associations have appeared in previous issues of the DENTAL COSMOS, attention is again called to the fact, in view of their importance. The great value of the work of these bodies in its effect upon dental advancement both scientific and practical, as well as upon the vital questions of dental education and legislation now immanent, should enlist the hearty interest and co-operation of every practitioner. The programmes issued by both bodies are full and attractive.

The meeting of the American Dental Association will take place at Saratoga Springs, N. Y., Tuesday, August 4, and that of the Southern Dental Association at Morehead City, N. C., Tuesday, August 11.

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The fourteenth revised edition of this work is a marked improvement upon former editions. The author has a faculty of condensation equalled by few. It belongs to a class of books that has come into vogue of late years, a series of which, known as "The Quiz Compends," have been published in this city. This little volume answers the same purpose, although the questions are omitted. The space is occupied by valuable information, and the book is one of the best of its kind. M. H. C.

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DENTAL LEGISLATION.

DENTAL LAW OF FLORIDA.

FOLLOWING is the text of "An Act to amend an Act entitled an Act to provide for the appointment of a Board of Examiners and to regulate the Practice of Dentistry in the State of Florida, the same being Chapter 3711 of the Laws of Florida, approved June 7, 1887."

Be it enacted by the Legislature of the State of Florida:

SECTION 1. That section three (3) of an act entitled an act to provide for the appointment of a Board of Examiners and to regulate the practice of dentistry in the State of Florida, the same being Chapter 3711 of the Laws of Florida, approved June 7, 1887, be amended so as to read as follows:

SEC. 3. Be it further enacted by the authority aforesaid, That it shall be the duty of this board, first, to meet annually at the call of three (3) members of said board; thirty (30) days' notice shall be given of the annual meetings; secondly, to grant certificates to all applicants who have obtained a diploma from a reputable dental college and who pass a satisfactory examination; thirdly, to keep a book in which shall be registered the names of all persons licensed to practice dentistry in the State of Florida; fourthly, for which examination and certificate the board shall be entitled to receive a fee of ten dollars ($10.00) to defray the expenses of holding the meetings.

SEC. 2. All laws and parts of laws in conflict are hereby repealed.

SEC. 3. This act shall take effect immediately upon the approval of the governor.

Approved May 25, 1891.

HINTS AND QUERIES.

DEVITALIZING PASTE.—In the DENTAL COSMOS for 1887, p. 211, I published a formula for "nerve-paste" which was a combination of cocaine, menthol, and arsenious acid made into a paste with glycerin. Up to the time of publication I had used the formula with most satisfactory results in a large number of cases, but had carefully avoided its use when acute pulpitis existed, my rule being in such cases to institute a sedative treatment previous to the application of the devitalizing agent. The uniformly good results obtained from its use when limited as stated led to its more general application, with the result that in nearly all instances where it was applied to pulps already aching the pain was greatly intensified. A number of substances were tried experimentally, with the object of producing a devitalizing paste which should be capable of immediate application to the pulp in all cases whether actively inflamed or not, and whose use should be devoid of painful results. Of all the formulas tried, none have proved so uniformly satisfactory as a combination of arsenious acid with the so-called Robinson's Remedy, mixing sufficient arsenic with the Robinson's remedy to make a stiff paste. This paste is then worked into cotton fiber until it will hold no more, after which the cotton, so treated, is loosely twisted into a cord and cut up into pieces about the size of a small mustard-seed. These little pieces form a most convenient means for making the devitalizing application. They are slightly adhesive, and one can be accurately applied over the point of exposure and sealed in position in the usual manner. Out of somewhat more than one hundred applications made as stated, there has not been a single case of distressing pain resulting. When applied to an aching pulp the effect is sedative, the pain gradually subsiding until it disappears in about thirty minutes. Two explanations for its sedative property may be reasonably assigned. First, the Robinson's remedy is strongly alkaline, and the excess of alkali acts as a sedative to the pulp, a property which is shared by all the soluble alkalis and their carbonates; and second, when the arsenic is mixed with the Robinson's remedy it enters into combination with the free potassium hydrate to form potassium arsenite, which is soluble. The arsenic is therefore presented to the pulp in a soluble form requiring no effort upon the part of that organ for its absorption, and consequently its irritating effect is reduced; but whatever may be the exact explanation, the satisfactory action of the combination is beyond question, and has led me to use it exclusively and without hesitation in all cases of pulp-exposure when devitalization is the correct procedure.—E. C. KIRK.

DECAY OF A REPLANTED TOOTH.—Attention having been called by Prof. W. D. Miller to the question of decay in replanted teeth (DENTAL COSMOS, April, 1891, p. 253), the following report of a case in my own practice may be of interest.

More than fourteen years ago (February, 1877) I replanted for a lady the right upper lateral incisor on account of chronic pericementitis after having filled a cavity in the mesial surface with gold. About a year subsequent to the replantation, caries took place upon the distal surface, and as I feared that the force incident to the insertion of a gold filling would be a source of irritation to the root, I filled it with cement. Since that time I have renewed the filling twice, the last time about four years ago.

The tooth, as in the case reported by Miller, has a chronic fistula opposite the apex of the root; nevertheless it remains comfortable and renders satisfactory service to the patient.—L. WEIL, M.D., D.D.S., Munich, Germany.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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ORIGINAL COMMUNICATIONS.

THE HUMAN MOUTH AS A FOCUS OF INFECTION.

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DURING the last few years the conviction has grown continually stronger, among physicians as well as dentists, that the human mouth, as a gathering-place and incubator of diverse pathogenic germs, performs a significant rôle in the production of varied disorders of the body, and that if many diseases whose origin is enveloped in mystery could be traced to their source, they would be found to have originated in the oral cavity.

It shall be my endeavor in the following pages (1) to call attention to the various diseases, both local and general, which have been found to result from the action of micro-organisms which have collected in the mouth, and to the various channels through which these micro-organisms or their waste products may obtain entrance to parts of the body adjacent to or remote from the mouth. The secondary nervous affections due to diseased teeth will not receive consideration; (2) to present in very brief form the present condition of our knowledge of the pathogenic bacteria met with in the mouth and the means at our command for combating them. I shall refer only cursorily to those topics which are of minor importance, or which have already become familiar to the profession through the periodicals, text-books, etc., giving more attention to those which are still subjects of study. I hope finally to be able to add some results of original investigations in this field, which may help to establish the great importance of a thorough understanding on the part of the physician, no less than of the dentist, of mouth-gèrms as a factor in the production of disease. The subject will be presented under the three following heads:

I. Disturbances of the Human Body which have been traced to the Action of Germs growing in the Mouth.

II. The Pathogenic Mouth-Bacteria.

III. Prophylactic Measures.*

I. DISEASES OF THE HUMAN BODY WHICH HAVE BEEN TRACED TO THE ACTION OF MOUTH-BACTERIA.

1. *Decay of the Teeth.*

In conformity with the nearly unanimous verdict of all recent investigations, decay of the teeth must be set down as the most widespread of all parasitic diseases to which the human body is subject; and although, as far as the life of the patient is concerned, the prognosis is exceedingly good and decay of the teeth may be pronounced one of the most trivial disturbances in the human economy, yet, if we take into consideration the results which follow a case of general decay, particularly in the mouth of young or weak persons, it often becomes a disease of very grave nature.

I venture to say that most practitioners of dentistry will agree with me that the havoc wrought by dental caries in the mouths of vast numbers of children, or even adults, among the lower classes is a much more serious thing than an attack of chicken-pox, rubeola, or even measles.

2–4. *Pulpitis, Gangrene of the Pulp, Pericementitis.*

Inflammation of the dental pulp, with the exception of the comparatively few cases where it is the result of trauma or of calcareous formations in the pulp-chamber, erosion, abrasion, etc., is due directly or indirectly to parasitic influences, while gangrene of the pulp can never have any other origin under any circumstances.

Pericementitis apicalis, the form of pericementitis which is most severe and gives rise to the most serious consequences, is likewise of parasitic origin, being produced by germs or their products, or by both together passing from the root-canal through the apical foramen.

That the pain attending a severe case of pulpitis or pericementitis is usually of so intense a character as to make it a very serious matter to the person who has to bear it, is too well known to need any comment. That the sufferer usually receives so little sympathy is to be accounted for by the fact that the direct mortality is almost zero, while the eventual loss of the tooth is often short-sightedly regarded as a matter of little consequence, in consideration of the fact that it is only one of a large number, and may eventually be replaced by a better one of porcelain, which cannot ache.

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*Sections II and III of this series will appear in the October and November issues of the DENTAL COSMOS respectively.—EDITOR DENTAL COSMOS.

5. *Alveolar Abscess.*

Alveolar abscess is an infectious disease, primarily of a local character, but frequently, or usually, accompanied by general symptoms of varying intensity, and sometimes attended by complications of a most serious nature. Severe cases of alveolar abscess, particularly in weak persons, not unfrequently present symptoms of an alarming nature. The extensive œdema, general debility, fever, chills, forcibly suggest the thought of a general infection, which, it must be admitted, is always possible where large masses of pus accumulate about the point of the root.

Leaving out of account for the present the more common complications of alveolar abscess, I wish to call particular attention to the many cases in which it has terminated fatally through the supervention of septicæmia or pyæmia.

It must be constantly borne in mind that wherever micro-organisms are accumulated in large masses in any part of the body, the possibility of their being carried to other parts through the blood or lymph-channels, and of their producing, accordingly, metastatic abscesses wherever a point of diminished resistance exists, can never with certainty be excluded. It has been repeatedly observed that most stubborn cases of chronic pyæmia, which have baffled all attempts of physicians either to cure them or to determine their cause, have disappeared on the removal or proper treatment of a diseased tooth. In like manner, general blood-poisoning (septicæmia), with speedily fatal termination, has been seen to result from accumulations of infectious material about the roots of a tooth.

The cases 1–70 of the table, pages 706–709, which I am convinced are but a small proportion of those which have actually occurred, may serve to illustrate this category of infections through alveolar abscess.

6 and 7. *Ostitis, Osteomyelitis.*

Ostitis and osteomyelitis belong to the more common complications of decay of the teeth. Every severe inflammation of the pericementum is naturally accompanied by more or less inflammation of the bone-marrow, or of the bone (osteitis), or of both together (osteomyelitis). Severe cases of osteomyelitis, fortunately of comparatively rare occurrence, are of exceedingly doubtful prognosis. Schede (table, 7–14) reports nine cases, of which all but one ended fatally, death resulting from acute or chronic sepsis, or from a spreading of the infection through the floor of the mouth and retrotonsillar tissue into the mediastinum, producing pleuritis, pericarditis, etc., with purulent exudations.

In the table many cases of osteomyelitis resulting from diseased conditions of the teeth or from operations upon them will be found. I refer in particular to Nos. 1–16, also 71, 76, and 77. It is worthy of remark that these cases occurred, almost without exception, in the lower jaw.

8 and 9. *Periostitis and Necrosis.*

A slight inflammation of the periosteum of the alveolar process and a slight necrosis of the bone necessarily accompany all abscesses in which the pus makes its way to the surface of the bone ; ordinarily, however, the symptoms are of minor importance, and disappear as soon as the pus has discharged through the gums.

Not unfrequently, however, periosteal inflammations resulting from caries are of an exceedingly violent character ; intense, continuous pain, often lasting for days, enormous swelling, debility, fever, chills, sometimes terminating fatally, as many cases in dental and medical literature show, through pyæmia or septicæmia, after an intervening stage of phlegmon.

Köhler* observed in two years forty-four cases of periostitis, which in some had led to extensive necrotic destruction. The periostitis proceeded often from diseased roots and quite as often from extractions, which by no means seldom lead to a kind of gangrene of the mouth (gangræna acutissima), and occasionally to general sepsis. "Consequently this little operation must in the future be carried out more in accordance with the fundamental principles of antisepsis than has been the case in the past."

Necrosis is but a more advanced stage of osteomyelitis and periostitis. The bone, deprived of all sources of nutrition, dies (becomes necrotic), and is afterward thrown off by the surrounding tissue in the form of a so-called sequestrum.

Whether the periostitis and necrosis result from a diseased condition of the teeth or of the gums (stomacace, noma), or accompany certain general diseases (syphilis, scrofula, the exanthemata), or follow upon the incorporation of certain mineral poisons (mercury, phosphorus, lead, arsenic), or, finally, result from traumatic injuries or impeded eruption of the wisdom-teeth, in many cases the sole agent, and in all an important one, in bringing about the disturbance is to be found in the bacteria of the human mouth.

Undoubtedly nearly all the cases given in the table were more or less complicated by periostitis, it being often lost sight of on account of other more serious symptoms. I call attention to Nos. 16–27, 77, 78, and 80–90, from which it will be seen again that the lower jaw is the usual seat of the trouble.

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* Charité Annalen. Jahrg. XIV and XV, 1888–89.

10. *Dental Fistulæ.*

In this connection I refer in particular to those fistulæ of dental origin which open on the neck, shoulder, arm, or breast, thus giving rise to so-called "running sores," which of course defy all treatment until the true source is discovered.

Nicolai (table, 56) relates a case where the connection of a chronic fistula on the breast just above the nipple was discovered by the discharge, on the day following a visit to the dentist, smelling like the medicament used by the dentist in treating a badly diseased root. A solution of cochineal injected into the root also made its appearance at the opening of the fistula a few hours later.

11. *Septicæmia.*

Many cases may be found in medical and dental literature in which a general infection of the blood causing the death of the patient in a few hours has resulted from the accumulation of pus about a diseased tooth or from operations in the mouth. Cases 28–31 and 91, 92 are of this nature. Fracture of the mandibula not unfrequently leads to a general septic infection. Malgaigne saw death result from fracture four times in seventeen cases, Richet twice in ten. Unfortunately, we know absolutely nothing about the specific bacteria present in these different cases, and as far as I know no attempt has ever been made to cultivate them or even to examine the blood and various organs microscopically in any case of septicæmia of dental origin.

12. *Pyæmia.*

Cases of pyæmia resulting from diseased conditions of the mouth and teeth are of more frequent occurrence than those of septicæmia, and in some respects of greater interest, particularly to the practitioner of medicine.

Chronic pyæmia presents itself in form of abscesses of varying intensity occurring in different parts of the body, healing spontaneously at one point, only to break out again at some other more or less remote. An abscess at the point of the finger or on the toe may originate in a diseased tooth as well as an abscess at the point of the root. The focus of infection maintained by the diseased tooth constantly gives up its virus to the blood or lymph by which it circulates through the system, and, under favorable conditions, establishes itself at any point where, at the time, there may be a diminished vitality, or in other words, a locus minoris resistentiæ. In all cases of chronic pyæmia a thorough inspection of the oral cavity should be made by a dentist or by a physician whose education in regard to oral pathology has not been so entirely neglected as heretofore has usually been the case.

A number of cases of pyæmia of dental origin will be found in the table, Nos. 32–47, 75, 90, 93, etc.

13. *Meningitis, Encephalitis, Abscess of the Brain, etc.*

It may at first thought not appear quite clear how an inflammation of the brain or its membranes, abscess of the brain, etc., may be brought about by carious teeth. A superficial examination of the relations of the teeth to the cavity of the skull will, however, show us that an inflammatory process incited by the teeth of the upper jaw may reach the brain cavity either through the maxillary sinus, nasal cavity, and cribriform plate of ethmoid bone (or directly through the nasal cavity and ethmoid), or through the pterygoid fossa and foramina at the base of the skull, or by way of the spheno-maxillary fossa, inferior sphenoidal fissure, orbit, etc. Inflammatory processes in the lower jaw ascending the ramus usually obtain entrance to the skull cavity by way of the orbit, less frequently, it seems, through the pterygoid fossa. Septic meningitis may be produced by germs obtaining entrance to the blood through wounds or abscesses and lodging at some weak point on the brain, while the possibility has been suggested that the micrococcus of sputum septicæmia may enter the blood through the lungs without the intermediary stage of pneumonia. Finally, inasmuch as croupous pneumonia is caused by a mouth-germ, so must the metastatic meningitis of pneumonia be looked upon as the work of a mouth-germ. Cases will be found in the table, Nos. 47–49, 54, 55, 64, 96–101, 117, 119, etc.

14. *Impeded Eruption of Wisdom-Teeth.*

The chronic state of irritation upon the gums and periosteum resulting from impacted wisdom-teeth, and the consequent state of diminished resistance, make it possible for micro-organisms, which obtain entrance between the crown of the tooth and the overlapping gums (assisted as they so frequently are by the irritating action of small particles of food undergoing fermentation), to multiply in large numbers and, penetrating along the course of the distal root into the depths of the jaw, to bring about the series of disturbances, ostitis, osteomyelitis, periostitis, phlegmon, trismus, and in some cases necrosis or even septicæmia. It is one of the many cases where bacteria which may be present in the mouth without leading to any disastrous results as long as the soft tissues are in a perfectly healthy condition, never allow any opportunity presented by the diminished resistance of the tissue to escape their notice. (See table, 117–120.)

15. *Pyorrhea Alveolaris.*

There are many reasons for believing that pyorrhea alveolaris has an origin similar to that of the suppurative processes associated with the impeded eruption of the lower wisdom-teeth. A predisposing cause which may be in part general and in part local sufficiently impairs the resistance to allow the pyogenic bacteria of the mouth to gain a footing. This view, which I have maintained for years, was supported by Galippe in a paper read before the dental section of the International Medical Congress, 1890. He found chiefly streptococci in all cases of pyorrhea alveolaris recently examined.

The evil results of allowing this disease to gain the upper hand manifest themselves not only in the impairing or complete loss of the efficiency of the teeth as organs of mastication, but also, as has been expressed by Galippe, when a secretion of matter in the mouth becomes general patients may suffer from fever, loss of appetite, stiffness, severe disturbances of the alimentary canal, insomnia, subictoritic discoloration of the skin, etc.

16. *Disturbances in the Alimentary Tract.*

The mouth, as has been sufficiently well established, furnishes one of the chief sources for the constant recruiting of the bacteria of the stomach and intestines. Not only this, but the constant swallowing of decomposing matter and of pus from an improperly cared for mouth may lead to the most serious disturbances, both acute and chronic. Particularly where a chemical or mechanical insufficiency of the stomach exists, the digestive process, and consequently the general health of the patient, is sure to suffer severely when the care of the mouth is neglected.

We have known patients under treatment for troubles of the digestive tract to most scrupulously sterilize all articles of diet and then pass them through a mouth seldom visited by a tooth-brush, thereby incorporating with them millions of bacteria. In all troubles of the digestive tract, too much care cannot be bestowed upon the antisepsis of the mouth.

17. *Diseases of the Lungs.*

a. Croupous Pneumonia.

The uniform results obtained by investigators on the subject of pneumonia for the last five years leave little room for doubt that the cause of this important disease is to be sought for in a species or group of micro-organisms which are constantly present in the sputum of persons suffering from pneumonia, and very frequently even in the saliva of quite healthy people. This micro-organism, or group of micro-organisms, will be discussed at length later on. At present I wish to emphasize only the fact that pneumonia owes its origin to a mouth-bacterium.

Furthermore, there is much reason in the arguments of Meltzer,* who claims that it is impossible for micro-organisms from the air to obtain direct entrance into the alveoli of the lungs through the air-passages with their numerous crooks and turns ; that they first lodge in the mouth or pharynx, from which they may, by a strong inspiration, be carried with particles of mucus into the broncheoli, to be then finally driven into the alveoli through the pressure of the air in the broncheoli during the middle phase of the act of coughing.

This view is supported by the fact, as shown by the investigations of Hildebrandt,† that the trachea, bronchi, etc., of healthy animals contain no living germs. Hildebrandt, moreover, came to the conclusion, after a series of very careful experiments, that by far the greater part of the bacteria of the air lodge in the mouth, nose, or throat, and that under ordinary circumstances these cavities furnish an almost perfect filter for the air. Again, it is highly improbable that the number of germs inhaled at any one time would be sufficiently great to maintain themselves in the human lungs without having undergone at least a temporary stay in the mouth, which serves as their recruiting- or breeding-place.

Furthermore, the micrococcus of pneumonia not only does not proliferate at the ordinary temperature of the air, but, what is of still greater importance, soon loses its virulence when cultivated out of the body even under the most favorable conditions, which is still another potent reason for the supposition that in pneumonia the mouth and not the air is the direct source of the infection.

b. Gangrene of the Lungs.

Bonome ‡ examined seven cases of gangrene of the lungs, and found in all seven the pyogenic staphylococci,—Staphylococcus pyogenes aureus and albus. He concludes that the necrosis of the lung-tissue is due to these micro-organisms alone, whereas the putrefactive processes are brought about by any ordinary saprophytic bacteria which may obtain entrance to the necrosed parts. The former are frequent, the latter constant inhabitants of the oral cavity, and the probability that the invasion takes place from the mouth is at least very great.

Positive evidence in support of this supposition was furnished by

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* Über die mechanischen Verhältnisse bei der Entstehung der Pneumonie. (*Med. Monatsschr.*, Feb. 1889.)

† Beiträge zur pathol. Anatomie u. Physiologie von Ziegler und Nauwerck. Bd. II, 1888, S. 143.

‡ Giornale della R. Accademia di Medicina, 1886, No. 7.

Leyden and Jaffé, who found in putrid sputum micro-organisms which hitherto have never been met except in the oral cavity.

The relation of mouth-germs to actinomycosis of the lungs will receive consideration later on.

18. *Infiltration of the Surrounding Tissue and Chronic Swelling of the Lymphatic Glands in the Region of the Lower Jaw and Neck.*

The causal relation of a diseased condition of the teeth to this affection has been clearly enough established by Odenthal,[*] who found glandular swellings in ninety-nine per cent. of all children who suffered from badly decayed teeth, and only in forty-nine per cent. of those with sound teeth. We are not so much surprised at this result, inasmuch as every practitioner must have repeatedly observed marked swelling and soreness of the glands of the neck concomitant with pericementitis of the lower bicuspids and molars.

19. *The Infectious Anginæ* (*Tonsillitis, Amygdalitis Infectiosa, etc.*)

It is now commonly recognized that the tonsils may harbor various pathogenic bacteria in their lacunæ without any appreciable evil consequences, until, through some cause or other, which may be of a very trivial nature, their action manifests itself either in form of a local or general infection. Particularly tonsils which are chronically inflamed, hypertrophied, are dangerous accumulators of pathogenic germs, and for this reason Bouchard [†] recommends their destruction by ignipuncture, while von Hoffmann [‡] obliterates the lacunæ by tearing with a blunt hook through the bridges connecting the neighboring lobes of the tonsils. He thereby not only destroys the recesses which so often contain masses of pus, bacteria, etc., in a state of putrefaction, but also produces a marked contraction of the hypertrophied gland. This operation is recommended as a prophylactic measure of great importance against diphtheria.

A. Fränkel [||] gives an account of two cases of severe septic infection proceeding from the organs of the throat. In the first case the disease began with a diphtheritic affection of the tonsils, and resulted in a retropharyngeal phlegmon, pericarditis, and pleuritis. In the pericardium he found a liter of pus, in the right pleural cavity extensive purulent, and in the left, sero-fibrous exudations. Cyanosis and dyspnœa were present.

Heubner and Bahrdt reported similar cases in 1884.

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[*] Inaugural Dissertation. Bonn, 1887.

[†] Thérapie des maladies infectieuses, p. 256.

[‡] *Theurapeutische Monatshefte*, October, 1889, p. 441.

[||] *Deutsche Med. Wochenschr.*, 1887, No. 15, p. 553.

In the second case before mentioned, there developed endocarditis ulcerosa, broncho-pneumonia, cloudy swelling of the kidney, infarction of the spleen. The tissues of both tonsils were infiltrated with sero-purulent matter, septic infection proceeding from the organs of the throat by means of staphylococci.

Fürbringer, in the discussion on Fränkel's cases, calls attention to the many cases where one is obliged to write "unknown mykosis," and records (1) a case of sepsis following upon a swelling of one of the tonsils; (2) a case of sepsis resulting from carious teeth (on the right and left side, respectively, one carious lower tooth), first giving rise to inflammation of the subgingival connective tissue, periostitis, and phlegmon; (3) a case of endocarditis ulcerosa and embolic meningitis resulting from a suppurating tonsil.

Apolant records a case of pyæmia, and Leyden a case of retropharyngeal abscess resulting from sore throat.

Numerous cases have been recently reported before the Société Médicale des Hôpitaux.

Among others, MM. Féréol et Rendu* report cases of phlegmon of the cellular tissue surrounding the larynx and œsophagus, followed by respiratory and cardiac troubles. Féréol† also reports a case of amygdalitis resulting fatally in five days through the supervention of a general infection. This case was characterized by a hiccough lasting through the whole sickness.

The authors just named demand that the most scrupulous attention be paid to troubles of the organs of the throat, even when they are of most trivial appearance.

Little is known as to the specific micro-organisms concerned in these cases. Bouchard‡ found enormous numbers of small bacteria in a case of phlegmonous amygdalitis. Cornil|| found streptococci in a case of abscess of the tonsils.

20. *Angina Ludovici*

presents itself as an inflammation of the cellular tissue beneath the lower jaw, giving rise to an exceedingly hard swelling, which may extend from the border of the lower jaw to the sternum. It may terminate fatally, either through œdema of the glottis, or, when suppuration takes place, through general sepsis. Under the name of Angina Ludovici, writes Tissier,§ we understand an infectious septic process, characterized by an induration with a tendency to gangrene,

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* *Annales de Médicine*, Mai 27, 1891.

† *Journal des Connaissances Médicales*, 1891.

‡ Vid. David, Les Microbes de la Bouche, p. 170.

|| Cornil et Babes, Les Bacteries.

§ *Progrès médical*, 1886, p. 514.

always appearing under the same symptoms, *resulting from a primary lesion of the mouth, which serves as point of entrance to the germs.*

Sufficient evidence has been accumulated* to render it highly probable that this severe, though rare affection, is the result of the invasion of micro-organisms through slight wounds, ulcerations, or other breaks in the continuity of the mucous membrane, or by way of diseased teeth, or of the tonsils, or of the ducts of the sublingual and submaxillary glands.

21. *Diseases of the Maxillary Sinus*

are of such frequent occurrence that every practitioner must have seen one or more cases. It is not necessary to refer to the fact that they are in the vast majority of cases the result of the action of mouth-bacteria.

Complications of these troubles which require particular mention are diseases of the nasal cavity, chronic catarrh of the frontal sinuses with constant flow of offensive mucus, spreading of the affection to the orbit and hence to the brain, or through the cribriform plate of the ethmoid to the brain, resulting in abscess of the orbit, abscess of the brain, meningitis. (Cases 49, 52, 65, 114.)

22. *Pneumococcus Abscesses.*

It has been well established that the so-called pneumococcus possesses invasive properties of the highest order, so that there is hardly any part or organ of the human body which may not fall a prey to its action.

Leaving out of account the croupous pneumonia and its sequels, such as pleuritis, pericarditis, œdema, emphysema, embolic meningitis, etc., we may mention here parotitis, multiple subcutaneous abscesses,† tonsillitis,‡ otitis media, abscesses of the mastoid process,|| peritonitis and meningitis (independent of pneumonia), etc. In such cases the coccus is transported from the mouth to other parts of the body through the blood or lymphatics, or as is often the case in otitis, meningitis, etc., by a direct spreading of the affection from the mouth to the neighboring cavities. The possibility has also been suggested of the pneumococcus obtaining entrance to the blood through the lungs and giving rise to a primary peritonitis, endocarditis, meningitis, etc., without the intervening stage of pneumonia.

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*Chantimesse et Vidal (v. David, Microbes de la Bouche, p. 173).

†Testi, *Riforma medica*, 1889, Nos. 281 and 282.

‡Gabbi, *Lo Sperimentale*, 1889, fasc. 4.

||Zanfal, *Prager Med. Wochenschr.*, 1889, Nos. 6, 12, 15, and 36; Netter, Compt. rend. hebd. des séances de la soc. de biol., 1889, p. 305.

23. *Disturbances resulting from the Absorption of Products of Putrefaction through the Mucous Membrane of the Mouth.*

In persons of uncleanly habits, who neglect the care of the mouth, and especially who allow rubber plates to remain in the oral cavity for weeks together, constantly covered with a thick coating of putrefying mucus and food, loss of appetite, nausea, vomiting, and chronic indigestion may result from the prolonged action of the products of decomposition upon the mucous membrane of the mouth and pharynx.

24. *Stomatitis Ulcerosa* (*S. Scorbutica*, *S. Mercurialis*).

These are nothing more nor less than the result of the invasion of pyogenic and saprophytic bacteria of the mouth upon a tissue which has already suffered a severe diminution in its powers of resistance through the general primary affection. There can be no doubt that the intense suppurative and putrefactive processes often appearing in advanced stages of these diseases are not the result of the action of the mercury or of the general condition known as scorbutus, these serving only to deprive the tissue of its normal power of resistance and so to prepare it for the invasion of the ever-present bacteria. This view, if I have not misinterpreted him, has already been expressed by Galippe.

The same is to a certain extent true of stomatitis diphtheritica, which seldom attacks the normal, healthy mucous membrane of the mouth, as well as of the stomatitis syphilitica, frequently met with in old cases of latent or "cured" syphilis.

25. *Actinomycosis.*

This disease is of so frequent occurrence and its connection with the mouth so apparent, that it requires only to be mentioned to carry with it an argument for a more commensurate estimation of the importance of careful attention to the hygiene of the mouth.

Of two hundred and three cases reported in German medical literature of the last five years, the point of entrance was found to be in the region of the mouth and throat one hundred and twenty times, not including the cases of actinomycosis of the intestines, where also the fungus most probably entered through the mouth. In nine cases the point of entrance was doubtful, and in the remaining seventy-four it was outside of the mouth. How often the infection took place directly from the air or through the food, and how often through germs which had established themselves in the mouth, cannot be determined from the reports.

Actinomycosis threads and glands have by various observers been repeatedly found in the saliva as well as in carious teeth, and in the lacunæ of the tonsils. Most frequently, carious teeth are brought into causal connection with the invasion, then slight wounds on the mucous membrane, colonization of the fungus in the tonsils, etc.

Imminger,* who examined over one hundred cases of actinomycosis bovis yearly, found the invasion to take place almost invariably from the tonsils.

26. *Noma*,

although a disease of comparatively rare occurrence,† excites particular interest on account of the fearful ravages which it produces and the rapidity with which it advances, so that in the space of three or four days the whole cheek, nose, eyelids, mucous membrane of the jaw and soft palate may be transformed into a necrosed, putrefying mass.

Whereas the majority of older writers on the subject of noma look upon this disease either as a trophoneurosis, or as a necrosis similar in its origin to the decubital ulcers of the throat, the majority of recent investigators are inclined to attribute the chief rôle to certain micro-organisms. Froriep ‡ appears to have been the first to call in the aid of a living agency in the form of appearances resembling yeast-fungi, which he found in noma. After him, Strueh || describes what he calls noma pilz, while Ranke § found masses of bacteria, almost all cocci, and Cornil et Babes ¶ found short chains of micrococci, either free or in zoöglœa.

Schimmelbosch,** to whom I am indebted for some of the above notes, found apparently a pure culture of bacilli on the border of the sound tissue, which he succeeded in cultivating upon artificial media.

Small pieces of necrotic tissue implanted under the skin of the neck of two rabbits caused abscesses, one as large as a cherry, the other three times as large, but no necrosis developed,—a result similar to that obtained by Ranke. Inoculation of rabbits with pure cultures caused œdematous swellings on the conjunctiva, in one case keratitis, in another panophthalmitis. Mice and doves proved immune; two hens showed circumscript necrosis which healed inside of three weeks.

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* Adam's Thierärztliche Wochenschr., 1888, No. 18.

† V. Bruns (Die Chirurgische Pathologie und Therapie der Kau- und Geschmacks-Organe, 1859, Bd. I) collected four hundred and thirteen cases out of the English, French, German, and Dutch literature.

‡ Chirugische Rupfertafeln, 1884.

|| Ueber Noma und deren Pilze. Inaug. Dissert., Göttingen, 1872.

§ *Jahrbuch f. Kinderheilkunde*, 1880.

¶ Les Bacteries, second ed., p. 394.

** *Deutsche Med. Wochenschr.*, 1889, No. 26.

Likewise, Grawitz* found bacilli in nearly pure culture. The appearance was described by Loeffler† as similar to that seen in diphtheria of calves.

27. *Pharyngomycosis* (*Mycosis Tonsillaris Benigna*).

An infection caused by a proliferation of saprophytic bacteria in the lacunæ of the tonsils.

28. *Stomatomycosis*,

caused by the colonization of sarcina on the mucous membrane of the cheeks, and

29. *Thrush*,

the well-known disease caused by the invasion of a yeast-fungus, Saccharomyces albicans. These are all troubles of undoubted parasitic nature, while as to

(30) *Stomacace*, (31) *Aphthæ*, (32) *Herpes Labialis*,

opinions are still divided.

33. *Inflammation and Suppuration*

of the salivary glands, in particular of the *parotitis*, must also be mentioned as troubles which in many cases owe their origin to mouth-bacteria which find their way through the ducts to the body of the gland.

Of diseases of a general nature with a localization in the human mouth, we notice briefly

(34) *Diphtheria*,

which may occur primarily in the mouth chiefly after wounds of the mucous membrane (extractions, etc.), or secondarily, the disease beginning in the throat and spreading into the mouth.

The unanimous results of nearly all investigators of the last two or three years have established the Klebs-Loeffler bacillus almost beyond all doubt as the cause, or one of the chief causes, of diphtheria. It is not at all clear, however, in just what manner the bacillus obtains a footing in the mouth or throat. Whether a chance germ from the air lodging upon the mucous membrane of the throat is sufficient to call forth an attack of diphtheria, or whether such germ only under certain predisposing conditions is able to proliferate in sufficient numbers to excite the disease, or whether, finally, the human mouth and throat in particular may harbor the diphtheritic bacilli under normal conditions until the proper moment arises for them to assert their specific action, these are questions awaiting solution.

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*Ibid., 1890, No. 15.

†Ibid.

The fact that an attack of diphtheria may be provoked by slight wounds in the mouth, or by the presence of diseased teeth, and the fact that the extirpation of the tonsils has proved to be one of the most successful prophylactic measures against diphtheria, seem to point to the conclusion that the last-mentioned condition is at all events highly probable.

35. *Tuberculosis.*

Many cases are on record in which primary tuberculosis of the mouth has made its first appearance around diseased teeth or roots of teeth, or following extractions and other operations in the mouth.

Whether or not the bacillus of tuberculosis can exist in the mouths of non-tubercular persons for any length of time is again uncertain. Examinations of the normal saliva have given only negative results, but too much importance should not be attached to this fact, since it is sometimes necessary to examine the saliva even of consumptives repeatedly before finding tubercle-bacilli. A case has been reported where fifty-nine examinations resulted negatively, while the sixtieth disclosed the long-sought-for bacilli. At all events, there is no danger of erring when we assert that the care of the mouth is to be considered as an important factor in the prophylaxis of tuberculosis also.

36. *Syphilis.*

The question of syphilitic infection through dental operations (extraction, filling), through unclean rubber-dam, instruments, drinking-glasses, through kisses, transplantation of teeth, bites, etc., has been so frequently discussed in dental periodicals, and must be so familiar, that a simple statistical inquiry into the question will suffice to show the importance of exceeding great care on the part of the dentist to prevent transmitting the disease to innocent patients. A few cases are presented in the table, Nos. 121–141. Anyone desirous of accumulating more will have no difficulty in finding them. Cases in which syphilis has been communicated by tooth-wounds, bites, slight wounds with instruments wet with saliva, as well as cases where the operator has been infected by syphilitic patients, must be counted by the hundreds.

37. *Infections following Operations in the Mouth.*

In recent years the demand for the adoption by dental surgeons of the same antiseptic measures observed by the general surgeon has constantly become more and more imperative. Attention has been repeatedly called to the fact that bloody operations in the mouth, such as tooth-extractions, performed, as too many of them are, without the slightest regard to the principle of asepsis, often lead to infections of serious nature, which might have been easily avoided ; not only that, but carelessness in regard to cleansing the instruments after every operation frequently results in the communication of disease from one individual to another. The following table (No. 71 *et seq.*) speaks for itself. It is only necessary to remark that the cases here cited form but a small proportion of those which have occurred, as every practitioner under whose hands such an infection results will naturally take all possible measures to prevent its becoming public.

38. *Infections resulting from Wounds with Dental Instruments.*

Numerous cases have recently been brought to light in which slight wounds upon the hand inflicted by instruments used in operations upon the teeth, also scratches of the fingers on sharp roots, have resulted in infections of a most serious nature.

To the same category belong infections received through kisses, blows upon the teeth, bites, etc., of which a few only are given below. (Table, Nos. 143–148.)

Stomatitis Epidemica.
Foot and Mouth Disease in Man.

Cases have been reported from time to time in the medical journals, in which foot and mouth disease has been communicated to man from domestic animals, particularly by contact with cows, through milk, butter, etc.

These cases are of a mild nature, exhibiting themselves chiefly in the form of vesicles on the mucous membrane of the mouth, more or less swelling of the gums, etc., but seldom manifesting severe general symptoms.

Under the above title, however, I wish to refer to an affection of a more serious nature, which, as will be shown, in all probability has the same origin as the foot and mouth disease in cattle, but which, being communicated directly from man to man, becomes more virulent than when communicated from cow to man, the relation presumably being the same as that between variola and varioloid.

The epidemic referred to occurred in one of the suburbs of Berlin, a district having a population of nine thousand persons, of which over six thousand have suffered from the disease in the last eighteen months.

Through the kindness of Dr. Siegel, I have been able to make a few observations on the disease, which he himself will soon describe in full in the *Deutsche Med. Wochenschrift.*

The disease first presents itself in the form of dizziness, faintness, and not unfrequently repeated swoons. The face of the patient presents a serio-comic expression, similar to the risus sardonicus of tetanus; skin pale, eyes watering, neck stiff, partial trismus, partial paralysis of the tongue, the patients whom I saw being unable to protrude the tip of the tongue more than one-fourth to one-half inch beyond the teeth. One, two, or three days later vesicles appear on the lips, tongue, and in the nostrils; these break open, giving rise to ulcerating surfaces; their contents are serous or often bloody. The gums swell, and in neglected cases putrefaction sets in, the teeth become loose and fall out, the fetor of the breath is intense.

In severe cases bleeding from the mouth, stomach, intestines, bloody fæces, bloody urine, albuminuria, intense swelling of liver, clouding of the lens, and blindness are frequent accompaniments or results of the disease. In some thirty cases the disease ended fatally, and in many more it assumed a chronic form, nearly or completely incapacitating the patients for all kinds of labor.

Dr. Siegel has found in the organs (liver, kidneys, spleen, etc.) of all cases (eight in number) where he made the autopsy a micro-organism which he has succeeded in cultivating, and which, injected subcutaneously, causes in goats, calves, and pigs the symptoms characteristic of foot and mouth disease; sections showing again the same micro-organism as found in the tissues of the human subject.

The disease is supposed to have spread chiefly through the beer saloons, where little attention is paid to cleansing the glasses between drinks. Bad hygienic conditions in most of the houses also favor the spreading of the epidemic.

As clearly indicated, the following table by no means presents a complete list of the cases which have been reported. Only within the last few days a number of new cases have come to my notice. There are many deficiencies in the table which might in part have been eliminated if I could have found the necessary time. The majority of them, however, are due to the meagerness of many of the reports in regard to details in the occupation, previous condition of the patient, the course of the disease, treatment, etc.

A LIST OF CASES

in which severe complications resulted from diseased teeth or from operations in the mouth. Those cases denoted by an * were furnished by Zahnarzt Dellevie, and were all observed in the Allgemeines Krankenhaus, Hamburg.

No.	REPORTER.	PATIENT.	CAUSE.	DIAGNOSIS, COURSE OF DISEASE.	RESULT.	REMARKS.
1	*	Man, age 48, healthy.	Diseased lower incisors.	Abscess, osteomyelitis, necrosis, laryngitis.	Death.	
2	*	Workman's daughter, age 5.	Carious tooth in lower jaw.	Parulis, osteomyelitis mandib., metastatic abscesses in lungs, etc.	Death after 4 days.	Treatment: incisions and drainage.
3	*	Workman, age 22.	"	Osteomyelitis mandib., angina Ludovici, glottis œdema.	Death after 1 day.	Treatment: incisions, tracheotomy.
4	*	Boy, age 5.	"	Osteomyelitis of left lower jaw, gangrene of lungs.	Death after 16 days.	Treatment: incisions and tonics.
5	*	Boy, age 4.	Carious teeth in lower jaw.	Diphtheria, catarrh, and later gangrene of lungs, osteomyelitis.	Death.	Treatment: tracheotomy, incisions of alveolar abscesses, tonics.
6	Fraenkel. Deutsche medicinische Wochenschrift, 1888, S. 931.	Workman, age 36.	"	Osteomyelitis, phlegmon, periostitis purulenta, mediastinitis suppurativa, œdema mediastinalis, pleuritis, pericarditis.	Death 24 hrs. after appearance of phlegmon.	
7–14	Schede. Ibid., S. 949.					Schede saw 8 cases of this nature: he considers them all as hopeless, "the patients die of acute or more chronic sepsis."
15	Private communication.		Caries of lower 3d molar.	Osteomyelitis, phlegmon, œdema of aryteno-epiglottic ligaments.		Result not ascertained.
16	Pietrzikowski. Oesterr.-Ung. Vierteljahrsschrift für Zahnheilkunde, 1886, S. 363.	Shoemaker's wife, age 26.	Alveolar absc., r. i. l. m.	Osteomyelitis, necrosis of articular process of right lower jaw.		Treatment: sequestrotomy incisions, sublimate irrigation.
17	Pel. Nederl. Weekbl., No. 12, 1882.		Caries of lower molar.	Suppurative periostitis, fever, chills, metastatic abscesses, pyæmia.	Death.	
18	Private communication.	Young workman.	Alveolar absc.	Ostitis, periostitis, extensive sloughing, acute gangrene, general septic infection.	"	The teeth and mouth were at the beginning in an exceedingly neglected condition.
19	Howse. Med. Times and Gazette, 1876.	Child, age 4½.	Carious teeth in inf. max.	Suppuration in inf. dent. canal, periostitis, ostitis of vault of skull, general pyæmia.	Death after 9 days.	
20	Coopman. Corresp.-Bl. f. Zahnärzte, Jan., 1889, S. 56.	Boy, age 8.	Absc., r. i. l. m.	Periostitis, septicæmia, metastatic abscesses.	Death after 5 days.	Extr. of tooth failed to arrest the disease.
21	Marshall. Dental Cosmos, Dec., 1888, p. 891.		Absc. of lower wisdom-tooth.	Suppuration, swelling, necrosis, gangrene, sepsis.	Death after 12 days.	

22	*	Driver.	Carious tooth.	Phlegmonous swelling of region of left lower jaw, periostitis mandib. sin.		
23	*	Girl, age 15.	Absc'd tooth, rt. inferior.	Ostitis and periostitis mandib. dext., endocarditis, pleuritis, nephritis, bronchopneumonia.	Death after 4½ months.	Treatment: incisions, digitalis, antipyrin.
24	*	Mason, age 61.	Diseased tooth in rt. inf. max.	Stomatitis gangrenosa, necrosis mandib., pneumonia.	Death after 4 days.	
25	GOODHEART. Med. Times and Gazette, 15 July, 1876.	Boy, age 4½.	Caries of tooth, inf. max.	Abscess, formation of pus in inframaxillary canal, periostitis of lower jaw, spreading of inflam. through fossa pterygo-max. to orbit, suppuration of both orbits, ostitis of the vertex of skull, pyæmia.	Death.	
26	H. ALLEN. Dental Cosmos, 1874, p. 569.	Young man.	Diseased wisdom-tooth.	Ostitis, periostitis, absc., collection of pus about hyoid bone, glossitis.	Death after 14 days.	
27	WHITE. Ibid., V. XVI, p. 641.	Boy, age 7.	Alveolar abscess.	Necrosis.	Loss of ½ of ramus of left side.	
28	MARVIN. Ibid., 1880, p. 27.	Gentleman.	Abscess of rt. l. m. after filling.	Extensive sloughing, septicæmia.	Death.	
29	*		Abscess.	Septicæmia.	Death in 48 hrs.	
30	PONCET. Gaz. des Hôpit., No. 19.		Carious tooth.	Ostitis, general septic infection.	Death after 48 hours.	
31	RITTER. Deut. Monatsschr. f. Zahnheilk., 1886, No. 8.		Abscessed tooth.	Septicæmia.	Death.	
-32	MCKELLOPS. Dental Cosmos, 1890, p. 949.		Accuml. of pus about diseased tooth.	Pyæmia (mistaken for malaria).	Recovery.	Treatment: extraction.
33	BEACH. Dental Advertiser, October, 1890.		Absc'd tooth.	Metastatic abscesses on pinna, in temporal region, on fingers, etc. with general symptoms.	Speedy recovery.	" "
34-44	PORRE. Dental Record, October, 1887.	Healthy man.	Diseased wisdom-tooth.	Chronic pyæmia.	Recovery after extraction.	Porre observed 10 more, similar cases.
45	BAKER. Ibid., July, 1888.	Young man.	Abscess of 2d molar.	Pyæmia.	Death.	The pyæmic symptoms appeared after the patient had caught cold in the tooth, and resulted fatally in three weeks.
46	BAKER. Ibid.	Widow in excellent health.	Abscess l. s. 1 m.	Pyæmia, abscess on fourth toe of right side, right ear, forearm, etc.	Recovery.	Healed by treating and filling root-canals.
47	*	Boy, age 7.	Caries of lower molars	Abscess, inflam. extending along n. inf. max. through orbit into brain cavity, abscess of brain, necrosis.	Death.	
48	FRIPP. Dental Record, August, 1887.		Abscess.	Meningitis.	"	
49	MAIR. Edinb. Med. Journ., May, 1866.		Pericementitis in upper jaw.	Inflam. of Highmore's antrum, caries of the ethmoid, abscess of orbit, arachnitis, encephalitis.	"	
50	ZWICKE. Charité Annal., Jahrg. 10, S. 393.	Locksmith, age 23.	Carious teeth in max. inf.	Gangrenous phlegmon, perforation of pus through floor of mouth, emphysema, stinking bloody pus, high fever, dyspnœa.	Recovery after 5 weeks.	Treatment: deep incisions, sublimate, etc.

A LIST OF CASES (Continued).

No.	REPORTER.	PATIENT.	CAUSE.	DIAGNOSIS, COURSE OF DISEASE.	RESULT.	REMARKS.
51	SCHWARTZ. Journ. des con. med., 1889, No. 17.	Steward, age 23.	Carious tooth r. i. 2 bc.	Angina Ludovici.	Recovery after 3 weeks.	Schwartz is of the opinion that in nearly all cases of this nature the entrance of the infection takes place through pharynx, tonsils, teeth, or duct of Wharton.
52	WILSON. Dental Review, No. 8, 1890.	Various cases.	Diseased teeth in upper jaw.	Pathological condition of cribriform plate, of ethmoid bone and frontal sinuses.		Wilson observed a number of cases of this kind, in which foul breath, constant discharge from nose and failing health resulted.
53	A. J. N. Dental Cosmos, 1875, p. 167.		Abscess after filling.	Tetanus.	Death.	
54	COLOMBE.		Diseased teeth.	Phlebitis of the sinuses of the dura mater.		
55	ROCKEY. Private communication.	Woman, age 45.	Dental abscess.	Phlegmon, abscess of orbit and brain.	"	The infection reached the brain by way of the spheno-max. fossa, inf sphenoidal fissure, orbit, sup. sphen. fiss.
56	NICOLAI. Deutsche Monatsschrift für Zahnheilkunde, VI Jahrg., 1888, S. 469.	Lady, age 33.	Carious tooth in inf. max.	Fistula of breast.	Recovery.	Treatment: extraction.
57	V. CARABELLI.		"	Fistula of armpit.	"	" "
58	CANTON. Dental Cosmos, Vol. XXII, p. 672.	Gentleman.	Diseased teeth.	General ill health, diagnosed as carcinoma of rectum.	"	In cases 58-60 the trouble was due to imperfect mastication of food and to consequent accumulation of fæcal masses in large intestines.
59	CANTON.	Young wife.	"	Indigestion, sterility.	"	Treatment: insertion of false teeth.
60	CANTON.	Gentleman.	"	Cramps of thigh, diagnosis: disease of spinal cord.	"	
61	*	Boy, age 14.	Carious tooth.	Tetanus.	Death.	
62	DETZNER. Deut. Vierteljahrsschr. f. Zahnheilk., 1877, S. 33.		Parulis.	Pyæmia.	"	
63	FÜRBRINGER. Deutsche Med. Wochenschrift, 1887, S. 553, No. 25.		2 carious teeth in lower jaw.	Inflam. of subcutaneous tissue, periostitis, phlegmon.	?	

64	PIERCE GOULD. Journ. of Brit. Dent. Ass., April, 1886.	? age 57.	Alveolar abscess, sup. max.	Sloughing, trismus, œdema, thrombosis of cavernous sinus, metastatic abscesses, pyæmia.	Death.	Incision and extr. of 6 molar teeth failed to arrest the disease.
65	SEYDEL. Münchener Med. Wochenschrift, 1889, S. 423.	Boy.	Carious tooth.	Empyema of Highmore's antrum, abscesses on various parts of body.	Recovery.	Treatment: extraction.
66	SEYDEL. Ibid.	Soldier.	?	Abscess of the hip, metastatic abscesses in different parts of the body, pain in processus mastoideus.	"	Treatment: trepanation.
67	ROBERT. Conférences de clin. chirurg., Paris, 1860.		Abscess of lower wisdom-tooth.	Purulent infiltration of side of neck, necrosis.	Rapid death.	
68	SCHMID. Oesterr.-Ungar. Vierteljahrsschrift für Zahnärzte, 1881, Heft 1.		Septic pulpitis of l. i. m.	Intense swelling, abscesses, necrosis, high fever, insomnia.	Recovery.	Not less than 70 pieces were thrown off.
69	R. PARK. Med. News, Oct. 6, 1888.	Young woman.	Diseased lower wisdom-tooth.	Phlegmon, extending from ear to chin, trismus.	Recovery after 2 months.	The mouth was opened by force, tooth extracted, and several incisions made.
70	SKOGSBERG. Deutsche Monatsschr. f. Zahnheilk., 1886, S. 13.		Diseased teeth in left upper maxilla.	Total blindness of left eye.		Completely cured in 11 days by extraction of the teeth.
71	ZAKHAREVITSCH. Vrach No. 34, S. 523.	Physician.	Extr. of l. i. 2 m.	Osteomyelitis.	Death after 6 days.	
72	ZAKHAREVITSCH. Ibid.	"	"	Ostitis, periostitis, general sepsis.	Death in 10 days.	
73	v. MOSETIG-MOORHOF. Oesterr.-Ungar. Vierteljahssschr. f. Zahnheilk., 1885, Heft 2.	Woman in 7th month of pregnancy.	Attempted extr. of r. i. 2 m.	Angina Ludovici septica.	Recovery.	The ang. Lud. was very malignant, for many days little hope of recov. Treatment: deep incisions, antiseptic dressings, etc.
74	v. MOSETIG-MOORHOF. Ibid.	Servant girl, age 44.	Attempted extr. of l. i. 2 m.	Intense swelling, gangrene of gums, suppuration, gangrenous phlebitis, myelitis, high fever, œdema of lungs.	Death.	Incision of gums, extr. of roots, antisep. mouth-washes, etc., of no avail.
75	v. MOSETIG-MOORHOF. Ibid.		Attempted extr.	Ostitis, phlebitis suppurativa, pyæmia.	"	
76	*	Workman, age 39.	Extraction of r. i. 2 m.	Phlegmon of neck and face, osteomyelitis necrotica mandib. dext.	Discharged after 10 weeks.	Treatment: sequestrotomy.
77	*	Butcher, age 25.	Extraction of a r. s. m.	Periostitis max. sup. and inf. dext., phlegmon capitis, osteomyelitis, pyæmia, endophlebitis ophthalmica, abscess in lungs, etc.	Death after 8 days.	Treatment: incisions and drainage.
78	BAUME. Lehrbuch d. Zahnheilk., S. 644.	Student.	Attempted extr. of l. s. 1 m.	Periostitis, necrosis, after 2 weeks pyæmia, pleuro-pneumonia.	Death after 14 days.	
79	BAUME.	Young man.	Extr. of a tooth with chronic parulis.	Pyæmia.	Death after 1 day.	This case should have been classed as septicæmia.
80	RITTER. Deutsche Monatsschrift f. Zahnheilk., Dec., 1886.	"	Extr. of 1 and 2 l. i. molars.	Suppurative periostitis, pyæmia.	Death after 10 days.	
81	*	Boots, age 28.	Extraction of r. i. 3 m.	Phlegmon of floor of mouth, periostitis max. inf. dext.	Discharged after 7 weeks.	Treatment: incisions and sublimate washes.

A LIST OF CASES (Continued).

No.	REPORTER.	PATIENT.	CAUSE.	DIAGNOSIS, COURSE OF DISEASE.	RESULT.	REMARKS.
82	*	Pastry-cook, age 30.	Extr. (fracture) l. i. m.	Periostitis mandib., abscesses.	Discharged after 9 days.	Treatment: incision and drainage.
83	*	Wife of a machinist, age 28.	Extraction l. i. m.	Periostitis mandib., deep-seated absc. in neck, osteomyelitis cruris.	Discharged after 5½ months.	
84	*	Wife of a copyist.	Extr. of tooth in lower jaw, left side.	Swelling, stomatitis, periostitis, abscess, trismus.	Discharged after 4½ weeks.	Treatment: incision, extr. of 6 carious teeth.
85	*	Boy, age 4.	"	Swelling of right lower jaw, abscess, periostitis.	Discharged after 5½ months.	Treatment: incision.
86	*	Waiter, age 18.	"	Periostitis, abscess of lower jaw.	Discharged after 6 days.	Treatment: incision, iodoform tampon.
87	*	Driver, age 26.	Extr. of roots in inf. max.	Abscess of cheek, periostitis, osteomyelitis mandib.	Discharged after 6 months.	Treatment: incision, sequestrotomy.
88	Private communication.		Extraction.	Periostitis, swelling and sloughing, loss of all teeth of lower jaw.		
89	KOEHLER. Charité Annal., 13. Jahrg., S. 518.	Blacksmith, age 33.	Extraction in inf. max.	Severe septic phlegmon of neck, ichorous periostitis, laryngitis, pharyngitis, pleuritis, broncho-pneumonia, myocarditis, hepatitis, œdema, hyperæmia of the lungs, etc.	Death 7 days after admittance.	Treatment: deep incisions, antiseptic dressings, tracheotomy.
90	*	Workman, age 20.	"	Periostitis, profuse suppuration, pyæmia.	Death.	
91	TULPIUS. v. Carabelli, Handbuch der Zahnheilkunde.	Physician.	Lancing gums.	Septicæmia.	Rapid death.	The inflamed condition of the gums rendered it easy for pathogenic mouth-bacteria to establish themselves in the wound. It is not necessary to assume that the lance carried infectious matter.
92	Anonym. Zahnärztl. Wochenbl., Sept. 8, 1888.	Peasant girl.	Extraction.	Hemorrhage, swelling, sepsis.	Death after 2 days.	The wound was in this case neglected, till the septic process was so far advanced as to render all help of no avail.
93	ARLT. Wiener Med. Wochenschr., 1883, No. 9, S. 241.	Boy, age 11.	"	Choroiditis, pyæmia.	Blindness.	

94	DIMMER. Ibid.	Boy, age 13.	Extr. in lower jaw.	Swelling, pain in throat, chills, choroiditis, protrusion of bulb.		Treatment: enucleation.
95	GOLDZIEHER. Ibid.					G. reports a case similar to 93 and 94.
96	LEYNSEELE. Bulletin de la Société de Gand, 1885.		Extr. in inf. max., with fracture at pt. of extr.	Meningo-encephalitis.	Death.	Pus ascended inner side of ramus, entered cranial cavity through foramina ovale, spinosum and rotundum.
97	DELESTRE. Des accidents causés par l'extraction des dents, Paris, 1870.	Robust man.	Extr. of l. s. molar.	Inflam. extending to brain, meningitis.	"	The inflammation reached the brain by way of the orbit.
98	DELESTRE. Ibid.	Factory girl, age 26.	Extr. of r. i. molar.	Swelling, suppuration, meningitis.	"	
99	ZAWADSKI. Gaz. lekarska, 1886, No. 8.	Locksmith, healthy, age 46.	Extr. of l. i. 3 molar.	Painful swelling, chills, sweats, stupor, pachymeningitis.	Death after 14 days.	
100	v. METNITZ. Oesterr.-Ung. Vierteljahrsschrift f. Zahnheilk., 1887, Heft 1.	Woman, age 43.	Extr. several teeth.	After 10 days chills, delirium, intense swelling, lockjaw, meningitis, osteomyelitis, stupor, coma.	Death after 10 days.	
101	Private case from clinic of Prof. KÖCHER in Bern.	Woman, healthy, married.	Extraction in inf. max.	Infection of gums and periosteum, swelling, œdema, suppuration, abscess, œdema of eyelid, exophthalmus, meningitis.	Death.	
102	CONRAD. Archives of Dentistry, Nov., 1886.		Extr. 2 teeth.	Tetanus.	"	
103	DULLES. Medical and Surgical Reporter, Jan., 1878.	Servant girl, good character.	Extraction.	Chancre of lips 2 weeks after extraction.		
104	OTIS. Lectures on Syphilis, New York, 1887, p. 102.		Filling.	Chancre of lips 3 weeks after operation.		
105	*	Workman, age 45.	Extr. 3 molars, 1 in upper, 2 in lower jaw.	Phlegmon of face.	Discharged after 5 weeks.	Treatment: incision and drainage.
106	*	Workman, age 39.	Extr. of roots of 1 and 2 upper mol.	Phlegmonous swelling of whole left side of face, high fever, enormous abscess, etc.	Discharged after 5 weeks.	Treatment: incision, and extr. of roots.
107	*	Painter, age 43.	Extr. 2 teeth in lower jaw.	Swelling, fistula, ulceration of mucous membrane of cheek, necrosis of lower jaw.	Recovery after 3 weeks.	Treatment: sequestrotomy.
108	SCHEDE. Deutsche Med. Wochenschr., 1888, S. 949.	Blacksmith, age 41.	Extraction.	Osteomyelitis.	Recovery.	Treatment: removal of outer lamella (discharge of pus), incisions.
109	FESSLER. Oesterr.-Ungar. Vierteljahrsschrift für Zahnärzte, April, 1891.		"	Phlegmon extending to breast.	Death after some weeks.	
110	LINDEMANN. Münch. Med. Wochenschrift, 1887, No. 25.	Woman, age 66.	Extr. of 5 teeth.	Purulent gastritis from swallowing infectious matter.	Death after 10 days.	
111	FESSLER. Oesterr.-Ungar. Vierteljahrsschrift, April, 1891.	Woman, age 26.	Extr. of roots in narcosis.	After some days slimy, purulent sputum, cough, pain right side of breast, pulse 140–160, stinking sputum, abscess.	Recovery after 3 months.	Treatment: incision and drainage.
112	FESSLER. Ibid.	Girl, age 19.	Extr. several teeth in narcosis.	Pneumonia, purulent pleuritis, empyema.	Recovery.	Treatment: empyem. operation.

A LIST OF CASES (Continued).

No.	REPORTER.	PATIENT.	CAUSE.	DIAGNOSIS, COURSE OF DISEASE.	RESULT.	REMARKS.
113	BURDETT. Ohio State Journal of Dental Science, 1886, p. 331.		Attempted extr.	Swelling, œdema of face, abscess of orbit.	Blindness.	
114	ZWICKE. Charité Annal., Jahrgang 11, 1884, S. 451.	Workman, age 43.	Extraction.	Inflammatory swelling of cheek with repeated fistulas, abscess of antrum, partial necrosis of upper jaw.	Recovery.	
115	RITTER. Deutsche Med. Zeitung, No. 46, 1891.	Healthy carpenter, age 45.	Extr. l. i. 2 m.	Swelling of jaw and lymphatic glands, trismus, fever, gangrene, necrosis, septicæmia.	Death after a few days.	
116	MADELUNG. Private communication.	Boy, age 4½.	Extr. r. 1 m.	Necrosis of alveolar process.	Recovery after 9 months.	Treatment: repeated surgical operations.
117	GALIPPE. Jour. d. conn. med., 1889, No. 40, p. 314 et No. 41, p. 321.	?	Impeded erup. of 3d molar.	Repeated swellings and trismus, fistulæ, myositis, meningitis.	Death.	Treatment: extr., sublimate.
118	GALIPPE. Ibid.	?	" "	Osteoperiostitis, abscess in fossa pterygoidea.	"	Pus made its way to sinus of base of brain.
119	TUEFFERT. L'union médicale, Vol. II, 1877, p. 618.	?	" "	Perimaxillary abscess, abscess of brain.	"	
120	DESPRÈS. Jour. d. conn. med., 1887, No. 13, p. 103.	?	" "	Phlegmon, asphyxia, sepsis.	"	Treatment: tracheotomy.
121	BAXTER. Dental Cosmos, 1879, p. 590.	Child, age 3.	Sucking the father's toothbrush.		Syphilis.	
122	? Ibid., Vol. X, p. 218.	Young lady, age 19.	Bite of her bridegroom in lip.		"	
123	AMBROSOLI. Ibid., p. 390.		Cigar stumps.		"	
124	AMBROSOLI. Ibid.		"		"	
125	MAURY. Ibid., Vol. XIII, pp. 103 and 330.		Kiss.		"	
126	MAURY. Ibid.		"		"	
127	HAYWOOD. Ibid., p. 330.		"		"	
128	NIEMEYER. Ibid., Vol. XII, p. 53.	Family of 10 persons.	Sugar teats.		"	
129	? Ibid., Vol. VII, p. 664.		Kiss.		"	
130	? Ibid.		"		"	
131	DECHAUX. Ibid., Vol. IX, p. 161.	10 workmen.	Use of gas-blower's pipe or tube.		"	The tube was passed from one to the other.
132	LANCEREAUX. Proceedings Académie de Med. de Paris (L'union médicale, 1889, p. 655).	Woman.	Extr. and filling.		Chancre of lower lip.	
133	GIOVANNI. Lo Sperimentale, 1889, p. 262.	?	Dental operations.		Chancre of lip.	

134	Roddick. Montreal Medical Journal, 1888, p. 93.	Woman, age 30, perfect health, mother of healthy children, wife of physician.	Extr. with considerable laceration.	Sloughing, induration, swelling of glands, etc.	Syphilis.	
135	Parker. Western Dental Journal, Feb., 1890.	Young woman.	Extraction.		Syphilitic infection.	The disease was subsequently communicated by the woman to her husband.
136	Bulkley. Dental Review, 1890, p. 347.	Gentleman of position, age 60.	Various dental operations by quack dentist, with unclean instruments.		Syphilis (chancre of tongue).	Resulting from a wound on the tongue.
137	Leloir. Leçons sur la syphilis, 1886, p. 62.	Man.	Cleansing.		Chancre of gums.	
138	Lydston. Journal of the Med. Assoc., 1886, p. 954.	Woman.	Cleansing and filling.		"	
139	Dulles. Med. and Surg. Reporter, Jan., 1878.	Servant girl, good character.	Extraction.		Chancre of lips 2 weeks after extraction.	
140	Otis. Lectures on Syphilis, New York, 1887, p. 102.		Filling.		Chancre of lips 3 weeks after extraction.	
141	Private communication.	Lady.	Transplantation.	Chancre, followed by general syphilitic infection.		The transplanted tooth was taken from the mouth of a street-walker.
142	" "	"	Extr. of r. i. c. i.	Chancre of gums, subsequently mucous patches, skin eruptions.		
143	Rockey.	Bartender.	Bite in left thumb.	Sequester, phlegmonous suppuration.		
144	Rockey.	Violinist.	"	Necrosis.	Loss of thumb.	
145	Rockey.	Loafer.	"	"		Lost sight of.
146	Rockey.	Lieutenant.	"	Swelling in 24 hrs. of whole arm, septicæmia.	Death.	
147	Private communication.	Dentist.	Wound in finger with dental instrument.	Chronic pyæmia, abscesses and phlegmons on all parts of body.		In the course of 2 years no less than 135 abscesses formed.
148	Verneuil et Clado. Comptes rendus, 1888, Vol. II.		Wound of finger with clasp of plate.	Abscess at point of finger.		Pus contained spirilla.
149	Horsley. Lancet, July 24, 1886.	Boy, age 7.	Carious milk molar.	Pain, swelling, chills, high fever, total necrosis mandib., metastatic absc., meningitis.	Exitus letalis.	The entire necrotic mandibula was removed by the fingers in one piece.

MINUTE STRUCTURE OF DENTINE.

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I. HISTORY.

C. F. W. BÖDECKER, in his paper, "The Distribution of Living Matter in Human Dentine, Cement, and Enamel,"* says,—

"The canaliculi of the dentine run in a more or less wavy course through the basis-substance, and are, as a rule, bifurcated only on the periphery of the dentine, both toward the enamel and cementum. Each canaliculus contains a central, slightly beaded fiber, which on its whole periphery sends delicate, thornlike elongations through the light spaces between the central fiber and the wall of the canaliculus. The thorns are distinctly conical, their bases being attached to the dentinal fibers, and their points directed toward the basis-substance. The smallest thorns spring in an almost vertical direction from the dentinal fiber, while somewhat larger offshoots may run obliquely through the basis-substance, and directly unite neighboring fibers with each other in the vicinity of the enamel and cementum. The basis-substance shows a distinct net-like structure. The light spaces surrounding the dentinal fibers send delicate elongations into the basis-substance, in which, through repeated branching, a light net-work is established, the meshes of which contain the decalcified glue-yielding basis-substance. The finest offshoots of the dentinal fibers can be traced only into the mouth of the elongations of the canaliculi; on the periphery of the latter, owing to their great delicacy, the offshoots are lost to sight. Coarser offshoots of the dentinal fibers, at the localities mentioned before, traverse the basis-substance within its light net-work, at the same time uniting dentinal fibers directly, and sending slender conical offshoots into the light net-work of the basis-substance." In the conclusion of his paper, Bödecker says, "The dentinal canaliculi are excavations in the basis-substance of the dentine, each containing in its center a fiber of living matter. Besides the dentinal canaliculi, there exists an extremely delicate net-work within the basis-substance of the dentine, into which innumerable offshoots of the dentinal fibers pass. Although we cannot trace the living matter throughout the whole net-work in the basis-substance, we are justified in assuming that not only the dentinal canaliculi but the whole basis-substance of the dentine is also pierced by a delicate net-work of living matter." From the quotations it plainly follows that Bödecker, in his specimens of dentine, decalcified with a solution of chromic acid and stained with carmine or chloride of gold, saw the living matter only in the shape of the dentinal fibers and their coarser and finer offshoots. He merely assumed the presence of such matter in the basis-substance where he was unable to see it directly, having before him only the light spaces which traverse the basis-substance in the shape of a light reticulum. J. L. Williams* likewise depicted coarser offshoots emanating from some dentinal canaliculi rendered visible by a solution of chloride of gold. This author, however, does not say anything about the minutest structure of the basis-substance.

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* DENTAL COSMOS, 1878–79.

Dr. Frank Abbott, in 1884, asserted his belief in the presence of a delicate reticulum throughout the basis-substance of the enamel. The method he resorted to was staining with chloride of gold and osmic acid solutions, with subsequent more or less complete decalcification of the enamel by means of a six per cent. solution of acetic acid. While pursuing his researches, which I am fully able to corroborate from personal observations in C. Heitzmann's laboratory, portions of dentine were successfully stained with either of the named reagents, and Dr. William Carr, who made studies in this direction, plainly demonstrated the presence of a reticulum throughout the basis-substance of the dentine. I am indebted to him for several excellent specimens made some four years ago. These specimens were demonstrated to a number of gentlemen of the medical and dental professions, among others to Drs. Frank Abbott and W. H. Atkinson. Abbott says on this point,† "The certainty of Bödecker's conclusions that the whole basis-substance of the dentine is pervaded by living matter has finally been reached by new methods adopted by William Carr, of New York, who, at his early convenience, proposes to lay the results of his studies before the profession." Dr. W. H. Atkinson in his paper, "The Origin of Pus,"‡ expresses his opinion in the following words: "The presence of this reticulum was first established by C. F. W. Bödecker in 1878, who saw light-rents in the basis-substance and assumed them to hold living matter without being able to directly prove its presence. This proof has been quite recently furnished by William Carr, who, after decalcification of the dentine, rendered the reticulum visible by staining with a chloride of gold solution and osmic acid. These last results have not as yet been published by their observer." I have seen his own specimens through lenses of 1000–1200 diameters with good immersion, and am convinced of the presence of the reticulum throughout the dentine. Since December I have pursued studies in this direction in C. Heitzmann's laboratory with his assistance, and to him I am indebted for the accompanying drawings.

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*DENTAL COSMOS, 1886.

†Annual Address of the President of the American Dental Association, August 28, 1888.

‡*Journal of the American Medical Association*, 1889, p. 11.

II. METHOD.

A freshly-extracted tooth, preferably a deciduous one, is sawed into sections, either vertical or transverse, with the precaution that the tooth and instrument employed are kept constantly moist with a one to two per cent. solution of sodium chloride. The object of this procedure is to prevent the drying up and consequent shrinkage of all soft constituents of the dentinė, viz: the dentinal fibers and their offshoots. The slab thus obtained is ground first with a coarse corundum-wheel on the lathe, and afterward on a corundum-slab of medium grit, always under a weak solution of table-salt. I wish to lay stress upon the fact that the ground slabs should not be kept longer than two hours in the salt solution, lest the dentinal fibers should become hydrophic, and, swelling up, completely fill the canaliculi. Before staining, cleanse the specimen with a camel's-hair brush from the adhering *débris* resulting from the grinding. The next process is staining with a one-half of one per cent. solution of chloride of gold, or one per cent. solution of hyperosmic acid. Since the latter has proved inferior to the former, it has been abandoned, and chloride of gold is exclusively employed. Two ways have been adopted. Pour the chloride of gold solution over the slab and leave it immersed two hours, carefully shutting off the light; then transfer the slab with a wooden spatula, carefully avoiding all metallic instruments, into a six per cent. solution of glacial acetic acid for two hours. Repeat this procedure, viz: staining with the gold salt and decalcifying with acetic acid from ten to twelve hours, after which the now pliable slab is left exposed to strong daylight in distilled water until it has assumed a dark violet color; or expose the slab to the action of the gold salts for ten hours, and then to the solution of acetic acid for the same length of time, and expose to light in distilled water. The latter method is preferable, although the specimens are sometimes partially overstained and become too dark for examination. After the required color is reached, brush the specimen gently in order to remove the precipitations of the gold salt, and mount in chemically-pure glycerin.

There is a marked difference in the behavior of enamel and that of dentine in the process of decalcification by acetic acid. Enamel at first breaks up into prisms with transverse blocklets, similar to those obtained by treatment with dilute hydrochloric acid. Upon the approach of complete decalcification the enamel becomes extremely brittle, and breaks up into small pieces if the least pressure is exerted upon it. After complete removal of the lime-salts, only a delicate reticulum is left, as first seen and described by Dr. Frank Abbott as early as 1878,—the last residues of organic material.

Dentine resembles enamel only in that particular that in incomplete decalcification blocklets of lime-salts are seen throughout the basis-substance. After complete decalcification a tough, pliable slab is left, which, even though exposed to some pressure, will not break asunder. Obviously the glue-yielding basis-substance and its tenants are not corroded or affected in the least by the six per cent. solution of acetic acid. All this acid accomplishes is the removal of the lime-salts deposited in the basis-substance, thereby rendering clear its minutest structure. Exposure of a ground slab of dentine to the action of the gold solution for three hours renders the dentinal fibers plainly visible and tinted a pale violet. Exposure of six hours will stain the dentinal fibers dark violet, and will bring out clearly the broader offshoots. An exposure of from nine to ten hours is necessary to bring forth the more minute conical offshoots emanating from the dentinal fibers and the minutest structure in the basis-substance.

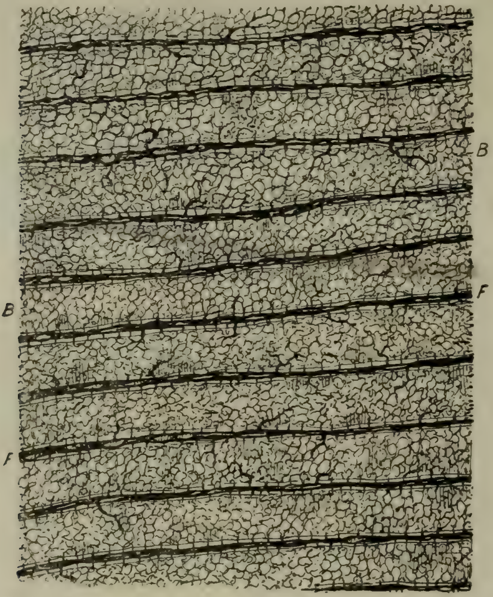
III. Main Mass of Dentine.

If successfully stained portions are placed under an amplifying power of from 1000 to 1200 diameters, striking features become recognizable in the dentinal fibers themselves. Should the method described above be faithfully carried out, we will invariably see portions of a varying extent suitable for the amplification just stated. It makes no difference whether water or cedar-oil immersion is resorted to. I have examined my specimens with a twelfth and a sixteenth homogeneous immersion of Zeiss, while Abbê's condenser was left in the sub-stage and the light concentrated by the application of the smallest diaphragm. I have also examined the specimens with a sixteenth water-immersion lens of the late Tolles, of Boston, likewise using the smallest diaphragm. The result was identical with both lenses, but I found that the image was a trifle clearer under the American water immersion than under the German cedar-oil lens.

The dentinal fibers in the main mass of the dentine do not look homogeneous, as in the unstained condition, but appear hollowed out in their interior by light spaces, so-called vacuoles, of greatly varying sizes. These vacuoles are plainly visible if the ground slab is left exposed for the shortest possible time to the salt water. If this exposure is protracted for days, the vacuoles will appear enlarged and almost continuous within the dentinal fibers. Both longitudinal and transverse sections exhibit the vacuoles; I have obtained the most distinct image, however, in thin longitudinal sections, where but one layer of dentinal fibers was visible. (See Fig. 1.)

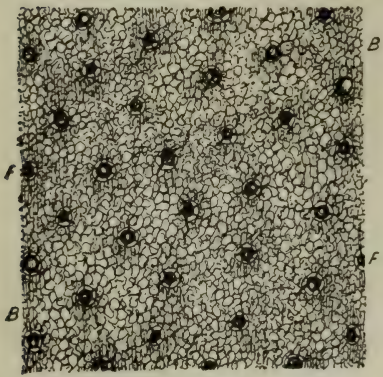
From the rather uneven periphery of the dentinal fibers arise a smaller number of broad and a large number of delicate conical offshoots, all of a dark violet tint. These offshoots pierce in an almost rectangular direction the light space of the dentinal canaliculus, and inosculate with a minute dark blue net-work pervading the whole basis-substance of the dentine. This net-work being present throughout the basis-substance, serves for a direct interconnection of all dentinal fibers. The net-work appears uninterrupted wherever sufficiently stained, although we may fail to trace the connections in some limited portions of the basis-substance. In transverse sections of the dentinal canaliculi, such as we invariably obtain in longitudinal sections of the crown, and, as a matter of course, in transverse sections of any part of the tooth, we notice features identical with those of longitudinal sections. (See Fig. 2.)

FIG. 1.



Main mass of dentine of a temporary tooth, stained with chloride of gold, decalcified with acetic acid. × 1200. *F*, *F*, dentinal fibers, partly vacuoled; *B*, *B*, basis-substance, traversed by a reticulum.

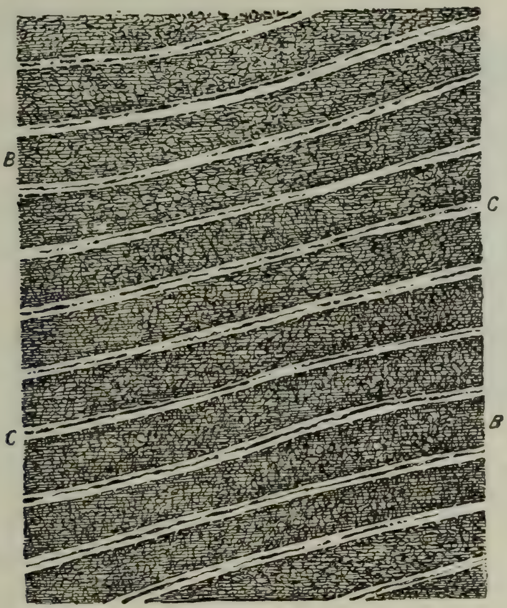
FIG. 2.



Dentine of temporary tooth. Transverse section of canaliculi, stained with chloride of gold, decalcified with acetic acid. × 1200. *F*, *F*, dentinal fibers, with radiating offshoots piercing the space of the canaliculi; *B*, *B*, basis-substance traversed by a delicate reticulum, in connection with the dentinal fiber.

The dentinal fibers of somewhat varying diameters exhibit hollow centers in many instances. From their periphery broad and narrow offshoots spring forth in a considerably larger number than ever visible in sections of teeth not treated with chloride of gold. The basis-substance appears to be traversed by a dark violet reticulum of the same character as that of longitudinal sections. Oblique sections will of necessity show an apparently larger number of dentinal canaliculi and their tenants than longitudinal or transverse sections in a given area of dentine. Here we often obtain the impression that rectangular offshoots of one dentinal fiber inosculate directly with neighboring fibers, thus furnishing a pretty figure of a ladder with minute rungs. These images were seen by Dr. W. H. Atkinson, and are alluded to in the historical part of my paper.

FIG. 3.



Dentine of a dead temporary tooth, stained with chloride of gold, decalcified with acetic acid. × 1200. *C*, *C*, canaliculi, holding shriveled dentinal fibers; *B*, *B*, basis-substance, holding a shriveled reticulum.

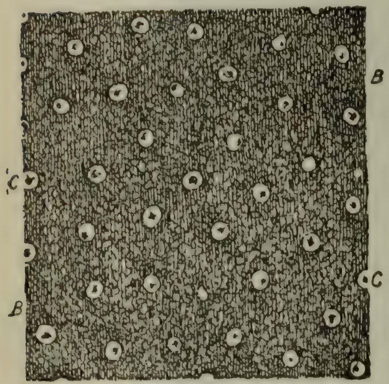
All that I have described thus far as being present in the main mass of the dentine is plainly visible only in the dentine of teeth that were alive at the time of extraction. If life has been destroyed to a varying extent by an alveolar abscess or pyorrhea alveolaris, the image furnished by the dentine is so characteristic that we recognize at the first glance the extinction of life. Several times have I ground teeth without knowing that they were dead. The microscope revealed the fact. (See Fig. 3.)

In longitudinal sections only the canaliculi are conspicuously prominent, exhibiting delicate and numerous interruptions along their walls.

The dentinal fibers appear shriveled up to rows of minute granules, not always in the center of the canaliculus, but frequently quite near to one of the walls. The granules often appear interrupted to a considerable extent, and sometimes the remnants of the dentinal fibers are missing altogether. No conical offshoots emanate from the remnants of the dentinal fibers. The basis-substance shows a rather faint and indistinct reticulum, lacking connections in numerous places. In transverse sections of dead portions of the dentine we obtain a striking image. (See Fig. 4.)

We see the dentine pierced by light spaces at almost uniform distances, many of which contain dark violet granules or vestiges of a previous dentinal fiber. There are but scanty and incomplete indications of conical offshoots emanating from the shrunken dentinal fibers. The basis-substance is of the same character as found in longitudinal sections. The basis-substance shows a rather indistinct dark violet reticulum with numerous interruptions. The facts here described suffice, in my judgment, to determine the nature of the reticulum pervading the whole of the dentine. It is of necessity the living matter which is plainly marked in living, and shriveled and reduced to a row of granules in dead teeth. Since we know of no tissue constituted of nerves, we cannot support the suggestion of John Tomes, that dentinal fibers are but nerve-fibers carrying sensation from the periphery to the center. Since we know that non-medullated nerve-fibers have the same structure as the dentinal fibers, we must conclude that both the nerves and dentinal fibers are made up of living or contractile matter, the contraction of which is facilitated by the presence of vacuoles. For, according to modern researches, the conduction of sensation centripetally and of motion centrifugally is very probably instituted by the contraction of living matter.

Fig. 4.

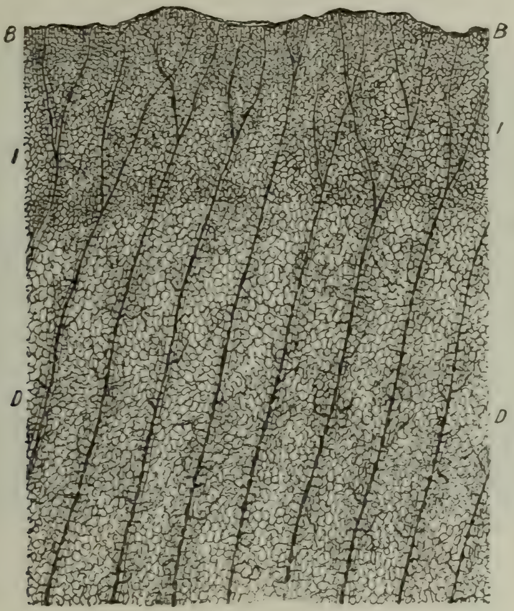


Dentine of a dead temporary tooth. Transverse section of canaliculi, stained with chloride of gold, decalcified with acetic acid. × 1200. *C*, *C*, dentinal canaliculi, holding shriveled dentinal fibers; *B*, *B*, basis-substance, containing a shriveled, indistinct reticulum.

IV. Interzonal Layer between Dentine and Enamel.

In all the provisional teeth that I have examined a zone of varying breadth was visible along the outer periphery of the dentine, conspicuous by a darker violet stain than the rest of the dentine. In fact, this region is rather prone to be overstained and become too dark for examination with high powers ; hence, we should examine this region before it has assumed a deep stain, owing to a protracted exposure to light. The first feature which strikes us upon approaching the outer periphery of the dentine is the beaded appearance of the dentinal fibers, lacking vacuoles in this situation. The fibers are bifurcating, as is well known, and, becoming more and more delicate, correspondingly exhibit more and more beads. The reticulum into which the lateral conical offshoots of the dentinal fibers inosculate is extremely dense,—much more so than in the rest of the dentine. The densely reticulated zone usually corresponds to the depth of the bifurcations of the dentinal fibers ; in other words, it commences in a rather abrupt line in the height in which bifurcations begin to appear. (See Fig. 5.)

FIG. 5.



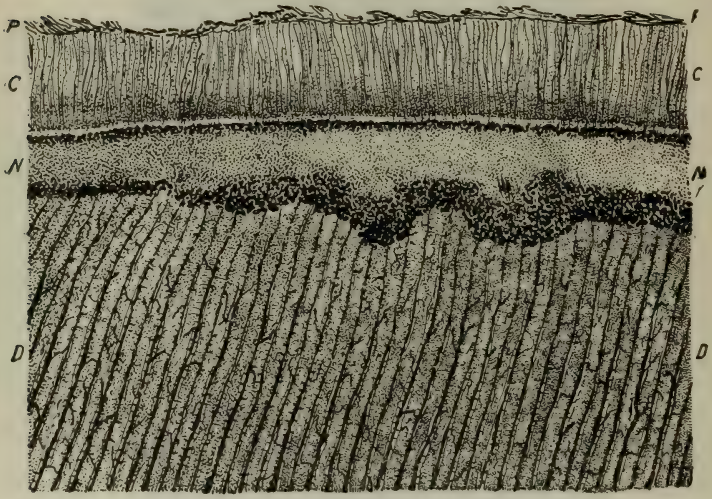
Dentine of temporary tooth, near enamel, stained with chloride of gold, decalcified with acetic acid. × 1200. *B*, *B*, boundary of dentine toward enamel ; *I*, *I*, interzonal layer (Atkinson), with a dense reticulum, dentinal fibers bifurcating ; *D*, *D*, main mass of dentine, holding beaded dentinal fibers.

The presence of this dense reticulum of living matter obviously explains the fact that the interzonal layer between enamel and dentine is so extremely sensitive. I am sure that every dentist is made aware of this striking fact when cutting into dentine. The dentinal fibers rarely enter the enamel in human teeth, but, as already stated by Bödecker (l. c.), the reticulum of the dentine is continuous with that of the enamel. This connection, however, I was unable to trace myself, as in all my specimens the enamel was dissolved and removed by the camel's-hair brush prior to mounting.

V. INTERZONAL LAYER BETWEEN DENTINE AND CEMENTUM AT THE NECK OF THE TOOTH.

Ever since John Tomes* drew attention to the peculiar fact that the dentinal fibers stopped short of the cementum, special attention has been paid to this region of the dentine, since it is also known to be more sensitive than the rest of the dentine. According to Tomes, "the greater degree of sensitiveness observable in the dentine immediately below the enamel—that is, at the point of ultimate distribution of the dentinal 'tubes,' and consequently of their contents—may be fully accounted for on the supposition that the latter are organs of sensation, the highest sensibility of which is confined to their branches."

FIG. 6.



Neck of temporary tooth. Longitudinal section, stained with chloride of gold, decalcified with acetic acid. × 400. *D*, *D*, dentine, main mass; *N*, *N*, dentine of neck, bordered upward and downward by coarsely granular layers; *C*, *C*, cementum of neck; *P*, *P*, shreds of pericementum.

This hypothesis does not find foundation in the region of the neck, where bifurcation of dentinal fibers are often missing or are scanty. There is only a uniformly granular layer visible in unstained and ground specimens between the surface of the dentine and the terminal points of the dentinal fibers. Still, the sensitiveness at the neck is undoubtedly even greater than that of the interzonal layer of the crown. Bödecker (l. c.) drew attention to the fact that in the great majority of teeth the finest terminations of the dentinal fibers are lost to sight in a net-work somewhat coarser than that of the basis-substance of ordinary dentine. Sometimes, he says, the dentinal canaliculi upon approaching the periphery become slightly dilated, so as to produce slender pear-shaped cavities, in accordance with which the terminating dentinal fibers exhibit slight enlargements.

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*System of Dental Surgery. Eng. ed., 1871.

I can corroborate this statement of Bödecker from what I have seen in my own specimens of temporary teeth. Several times I have met with peculiar formations in this region, which, as far as I am aware, have not as yet been described. (See Fig. 6.) In unstained slabs of temporary teeth I have seen coarsely granular layers in the dentine at the region of the neck, with which the dentinal fibers directly inosculated. After deep staining with chloride of gold, the granular layers became dark violet and easily recognizable with low powers of the microscope. I found, as a rule, one or two granular layers like narrow ribbons running along the outer periphery of the dentine, close to the cementum. A much more irregular and broader granular layer was seen at a certain distance below the surface, producing wavy lines, and being in connection externally with a more uniformly granulated layer, and internally with the dentinal fibers. This peculiar configuration was plainest at the portion of the cementum made up of spindles at the neck of the tooth, and gradually faded downward where the lamellated layer of the cementum began to make its appearance. High powers of the microscope revealed the intimate structure of this portion. (See Fig. 7.)

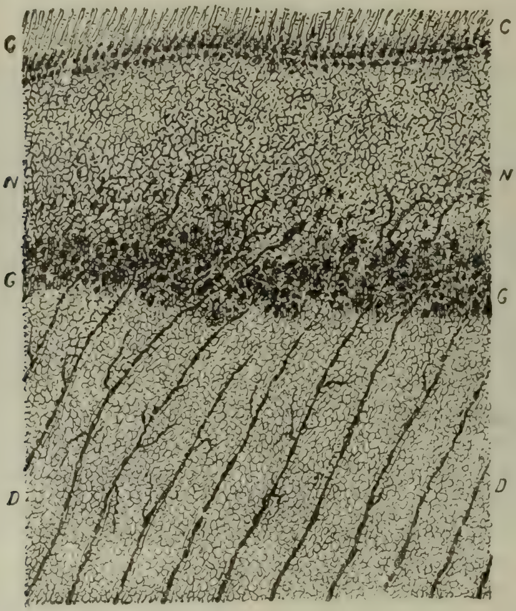
The fibers in this situation appear reduced in caliber, and show a beaded structure much the same as at the periphery of the crown. These fibers either terminate in pear-shaped enlargements, such as are described by Bödecker, or in irregularly shaped dark violet lumps, which send delicate offshoots in all directions, serving as an intercommunication between them. The large number of these lumps causes the granular appearance of the dentine. The following broader zone, which with lower powers has appeared uniformly granular, is now dissolved into a rather coarse reticulum,—much coarser than that of the interzonal layer of the crown. This reticulum shows stray irregular fibers. Both the latter and the lumps are in close connection with the reticulum.

At the outermost periphery we again notice one or two rows of enlargements, which, judging from the regularity of their arrangement, correspond to the bases of the spindles, building up the cementum of the neck. This large amount of living matter satisfactorily explains the extreme sensitiveness of the region of the neck.

VI. SECONDARY DENTINE.

In several of my specimens of temporary teeth I have met with secondary dentine toward the pulp-chamber. I have seen its two main varieties: the one characterized by the presence of a regular and wavy dentinal canaliculi, distributed in the basis-substance in the form of bundles or sheaths, and the other marked by the presence of bone-corpuscles, the so-called osteo-dentine. I must confine my remarks to the former variety, as the latter was seen accidentally only in dead teeth. (See Fig. 8.)

FIG. 7.

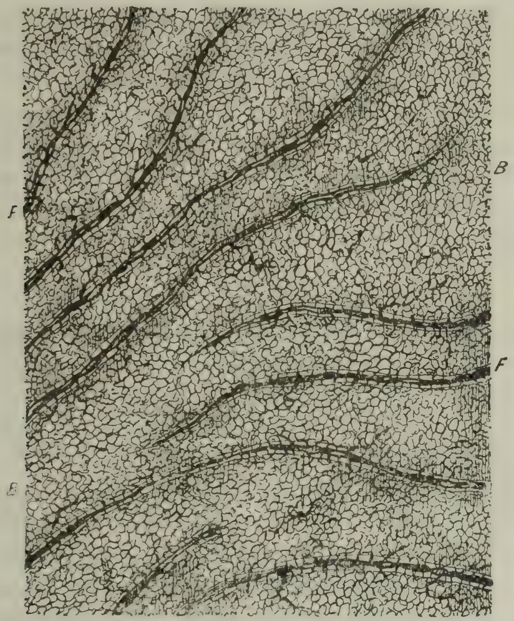


Dentine of neck of temporary tooth, stained with chloride of gold, decalcified with acetic acid. × 1200. *D, D*, dentine; *G, G*, coarse globules, into which the dentinal fibers inosculate; *N, N*, dentine of neck, with a coarse reticulum, lacking fibers; *C, C*, cementum of neck, bordered by a granular layer toward the dentine.

The dentinal fibers are rather large and supplied with numerous vacuoles in their substance. Numerous coarser lateral offshoots arise from these fibers, apparently more numerous than in primary dentine. Besides, there were seen coarse conical offshoots springing from the periphery of the dentinal fibers and running into a reticulum, which in some places at least was coarser than that of the primary dentine. This reticulum also appeared more irregular in the secondary than in the primary dentine.

To sum up my observations, I must maintain the presence of a reticulum of living matter throughout the dentine. It is decidedly coarser than that seen and described by Frank Abbott in the enamel. It is most delicate in the interzonal layer of the crown between dentine and enamel, and coarsest in the region of the neck bordering on the cementum. The presence of a reticulum in protoplasm generally is nowadays admitted as a fact beyond all doubt,—may even be represented by means of photo-micrography. Since the history of development shows that dentine arises from protoplasm the same as all other tissues of the body, we are prepared to understand the presence of a reticulum of living matter in the basis-substance of the dentine also. The dentinal fibers are formations of living matter, the same as are non-medullated nerve-fibers. It is scarcely necessary to say that the dentinal fibers are not nerves, as suggested by John Tomes, since we do not know of any tissue made up of nerves and basis-substance. But living matter having the property of sensitiveness and of conduction of sensations renders the dentine a living tissue, the more so as its basis-substance is likewise endowed with properties of life.

FIG. 8.



Secondary dentine of permanent molar, stained with chloride of gold, decalcified with acetic acid. × 1200. *F*, *F*, dentinal fibers; *B*, *B*, basis-substance.

My assertion finds proof by comparison of living with dead teeth, for in the latter the dentinal fibers were reduced to a series of granules, and the basis-substance appears irregularly dotted or spotted, instead of being reticular. The microscope therefore easily reveals the difference between living and dead teeth. Another point of confirmation is that the portions of the dentine being most sensitive are richest in the supply of living matter, not in that of the fibers which are missing in the interzonal layer of the dentine of the neck, but in that of the basis-substance. We are now in a position to understand the changes of nutrition, of growth, especially the inflammation of the dentine so often induced by filling-materials.

The objection that the presence of a reticulum of living matter would interfere with the firmness of dentine is a merely theoretical one. For we know that all varieties of bone-tissue, including the most solid of the cortical substance, are traversed by a reticulum. The minuteness of this net-work explains the firmness and elasticity of the basis-substance in the way in which we explain pliability and firmness of electrical conductors made up of numerous strands of wire, or the pliability and firmness of a coat of mail built up of extremely thin steel wire. The meshes of this reticulum are, as far as their size is concerned, greatly in excess of the filaments of the net-work. It is only the meshes which hold the basis-substance so thoroughly infiltrated with lime-salts.

NECROSIS: ITS MICROSCOPICAL APPEARANCE, CAUSES, AND TREATMENT.

BY D. M. SABATER, A.B., D.D.S., M.D., NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, June 9, 1891.)

THE word necrosis is derived from the Greek *νεκρός*, a corpse. Before entering into the details of the condition, I will briefly touch on the points of difference between this disease, gangrene and caries. In necrosis we have devitalization of the histological elements of bone, in gangrene devitalization of soft tissue, with formation of slough. Caries of bone shows deterioration in quality, due to a collection of fat-globules with impaired physiological action of bone-cells, and presents two-thirds animal matter to one-third earthy, while in necrosis four-fifths are inorganic to one-fifth organic.

The differential diagnosis between these two diseases is easily made by means of the probe, the former showing softness, and the latter grittiness. Between healthy and necrosed bones, in probing, there is recognized a certain yielding of the necrotic process, while in the former there is resistance and a springing back of the probe upon touching it.

Under the head of necrosis we have two forms, the exfoliatory or proliferal, and the sequestrated or mixed. The first attacks only the surface and cancellous structures, as the alveolus, and is most commonly met with in children. The only antecedent is inflammation, induced by some local irritation through disturbance of the cell element of the affected parts. This inflammation reaching the periosteum, when followed by suppuration, cuts off the vascular supply; the bone-cells become inflamed, causing an increased functional activity, with increased deposition of earthy salts, which produces closure of the canaliculi and compression of lacunæ, and the bone-cells die.

It has been stated by several writers that the superior maxilla, being richer in its blood-supply and more protected than the inferior, is less liable to this disease. We might safely say that out of one hundred cases of necrosis of the maxillæ from seventy-five to eighty are seen in the lower jaw, and with greater tendency to enlargement and destruction, and disfigurement of the face by an external opening, due to the gravitation of pus in some cases.

I here present specimens, sections of which under the microscope show as follows:

The necrotic piece of the upper maxilla shows a remnant of the outer cortex in the shape of a soft, corroded lamella of the thickness of writing-paper; all the rest is made up of cancellous bone discolored to a dusky grayish-brown and irregularly corroded. The whole piece is of a soft consistence and extremely brittle, which goes far to prove that here the necrosis was the result of a long-lasting, chronic, suppurative periostitis and osteitis, which not only has corroded the bony structure, but also has led to a dissolution of the lime-salts to a considerable degree, causing a softness and brittleness of the whole piece. The thin cortex could be directly transferred in a small slab under the microscope, easily yielding to slight pressure exerted over the cover-glass. This slab showed much-enlarged, irregularly-bordered Haversian canals, mostly in an empty condition. The enlargement of the canals was in many places of such a degree as to bestow upon the bone-tissue a honeycomb appearance.

The lacunæ and canaliculi of the remnant of bone-tissue were found enlarged also, but empty and devoid of protoplasm.

The cancellous structure is likewise much corroded, and made up of thin and irregular bony trabeculæ. No trace of the previous medullary tissue was found.

The basis-substance of the necrotic piece of bone has lost its lamellate structure, and holds only small granules of lime-salts, pierced by the canaliculi, nowhere traceable in large numbers. This fact again proves that a somewhat chronic process of osteitis has preceded the necrosis, leading to a far-advanced decalcification of the basis-substance of the bone.

The necrotic piece of the inferior maxilla is on its outer surface pretty smooth, though entirely deprived of periosteum ; only here and there are found irregular erosions caused by osteitis, though nowhere extensive or penetrating very deeply. The inner surface has the aspect of cancellous structure with deeply-eroded bays, the bony trabeculæ being of dark grayish-brown color and mostly of the consistence of bone-tissue. The outer cortex shows in its minute structure but few symptoms of acute inflammation, but obviously has been rapidly deprived of its life by suppurative periostitis. The Haversian system is well preserved and contains almost unchanged central canals filled with granular detritus, and exhibiting traces of the previous capillary blood-vessels. The bone-corpuscles are likewise unchanged in size and shape, but instead of nucleated protoplasm they show a finely granular detritus, many of them having disappeared and left behind empty lacunæ and canaliculi.

The interior cancellous structure has been the seat of intense acute osteitis, preceding necrosis. The trabeculæ are much reduced in bulk, and their contours show a large number of bay-like excavations partly filled with micrococci and partly empty. The remnant of the trabeculæ exhibit much enlarged, irregular lacunæ, lacking bone-corpuscles altogether. Many lacunæ have assumed the size of Haversian canals, being, however, in no direct connection with the large former medullary spaces. Such enlargement of the lacunæ is known to be the result of acute osteitis. The dissolution of the lime-salts did not make much headway, except in the bay-like excavations at the border of the trabeculæ and in their middle. For this reason the consistence of said trabeculæ is that of bone-tissue, generally the difference being in their extreme brittleness. No trace of the previous medullary tissue was found, but only granular detritus and colonies of micrococci in its stead.

Causes.—1. From long-standing alveolar abscess. 2. Some obstinate ulceration of the mouth, as ptyalism, from mercury. 3. Syphilis, seen often at the palatine process of the superior maxilla, alveolus, or body of the bone ; very seldom in the lower maxilla. 4. Absorption of the fumes of phosphorus ; this form is in some cases very destructive ; it is seen in the upper, but most frequently in the lower jaw, occasionally in both. 5. Exanthematous fevers, as typhus, smallpox, scarlet fever, especially the latter, and frequently met with in children. 6. Improper handling of certain drugs, as arsenic. 7. Eruption of the third molars, in cases of small maxillæ and large teeth ; hence insufficient room. 8. External injuries, as blows, fractures, etc. 9. Traumatic injuries, as in cases of careless extraction of teeth. 10. Pressure of foreign bodies. Finally, to have necrosis there must be a certain predisposition of the patient by a run-down constitution and depression of vital power.

Treatment.—From the beginning of the inflammatory stage all causes of irritation should be removed, using antiphlogistics and brisk saline cathartics. Should necrosis take place regardless of this treatment, constitutional as well as operative methods will be required; strong tonics and the most nutritious diet; plenty of exercise in the open air; in old persons give stimulants moderately. Judicious incisions should be made in some cases for the free escape of pus. Free use should be made of antiseptics, of which several are recommended, as carbolic acid solutions, phénol-sodique, listerine, potassium permanganate, creoline, boracic acid, etc.; but the most efficient are bisulphite of soda, aromatic sulphuric acid, trichloride of iodine, hydronaphthol, pyoktanin, peroxide of hydrogen, and hydrargyrum bichloride solution, to inject and wash thoroughly the affected parts.

Some writers and practitioners advise the early removal of the sequestrum by scraping or burring out the area involved; while others advocate prophylactic treatment till nature throws off the sequestrum and the embolucrum has properly developed. I think that the former treatment is by all means the best, because by judiciously and properly burring out the necrotic pieces and reaching healthy tissue you get a fresh wound which under proper circumstances nature will soon heal by first intention.

In cases of syphilis, besides the local, a mixed treatment is advisable, consisting in the administration of mercury, either the proto-iodide or bichloride, with potassium iodide.

In anæmic cases give iron; but should this be in a liquid form, always follow its use with a strong alkaline mouth-wash.

Before concluding, I will relate a peculiar case of office practice: Miss L. V., from Nicaragua, Central America, suffering with necrosis of the right inferior lower maxilla (molar teeth, area involved), caused by an alveolar abscess from the second molar. Under treatment from June 3 until September 8, 1886, when the last piece of sequestrum was removed, and the parts were healing nicely.

The peculiarity of this case was the fact that every twenty-ninth or thirtieth day a marked dulness suddenly appeared on the affected side, with an increased inflammation and suppuration, regardless of treatment, this alarming condition only lasting two or three days. The sinus and cloaca were perfectly free and open, consequently there was no retardation of pus which would give rise to such temporary disturbance. After careful investigation of the case, I came to the conclusion that the only cause of this increased symptom was a physiologically disturbed systemic condition furnished by nature.

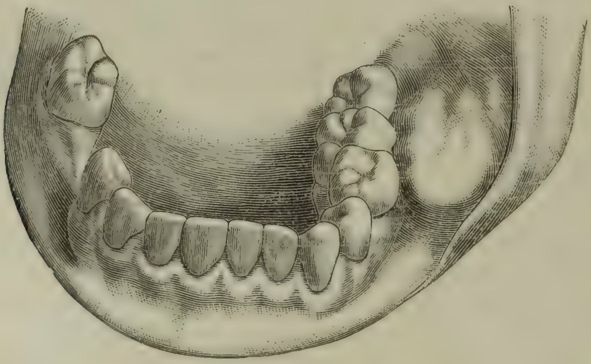
DENTAL DEVICES FOR CORRECTING DEFORMITY ATTENDING THE EXTIRPATION OF THE LEFT HALF OF THE INFERIOR MAXILLA.

BY ALBERT WESTLAKE, D.D.S., ELIZABETH, N. J.

DR. CHARLES MCBURNEY, surgeon to Roosevelt Hospital, New York, on March 14, 1891, requested me to examine the mouth of Mrs. K., age twenty-six, who had entered the hospital preparatory to the removal of a sarcoma involving a part of the inferior maxilla.

About one year previously the patient had first noticed a small lump on the outer side of the left inferior alveolar process, opposite the second molar. The enlargement had grown rapidly, especially during the last few months, and was extending posteriorly, accompanied by sensations of throbbing and itching. Fig. 1 represents the dental aspect of the jaw immediately preceding its excision. The tumor was about as large as an egg, was hard, painless, ulcerated on upper surface, and bulging chiefly outward. It extended nearly to the angle. The second molar was pushed far inward. In the left submaxillary triangle an enlarged lymphatic nearly as large as a bean was noted.

FIG. 1.

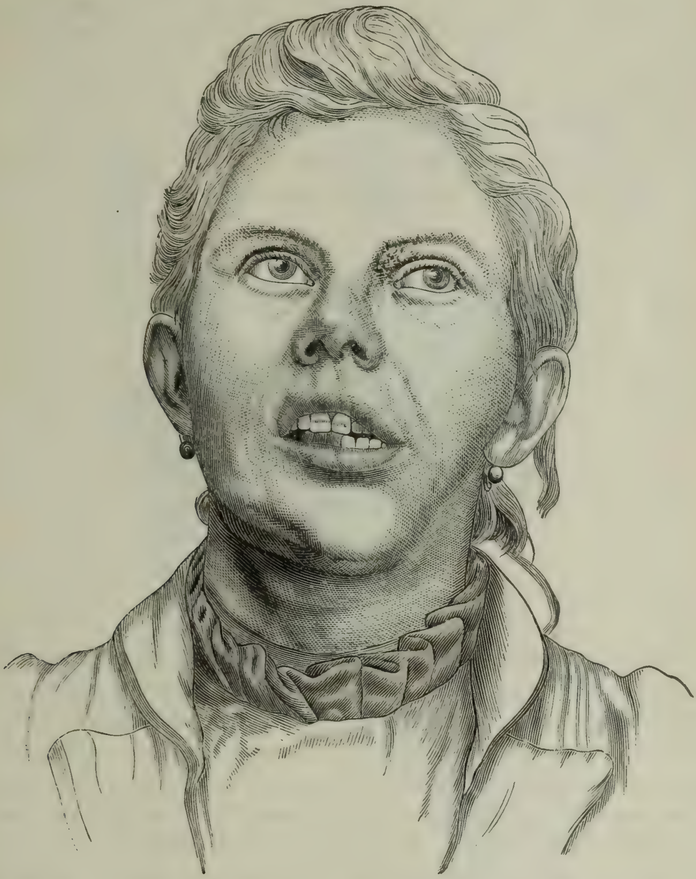


The plan suggested by Dr. McBurney was to have an appliance made and fitted to the mouth prior to the operation, so that immediately afterward the fixture could be inserted to retain the remainder of the maxilla in a normal position during the process of healing; this to be followed by a piece of mechanism such as would in some measure correct the great deformity which usually results from such an extensive loss of tissue.

I obtained correct plaster representations of the teeth in their articulating relations, and constructed an interdental splint, which was fitted and kept in readiness for use.

On March 21 Dr. McBurney operated with a view to the removal of nearly the entire left half of the inferior maxilla. An incision was first made just beneath the lower edge of the jaw, extending from the median line to the angle. This incision was supplemented by a vertical one extending from the angle upward along the posterior border of the ramus as far as the middle of the lobe of the ear. The cheek and superficial soft parts were dissected from the outer surface of the bone, and the muscles, etc., from the inner surface as far as the mucous membrane, keeping well off from the tumor. The mucous membrane was then divided, the left first bicuspid extracted, and the inferior maxilla sawed through at that point. The end of the left section was then seized and dislocated outward, the pterygoid muscles were divided, and the bone removed at the articulation.

FIG. 2.



The splint was adjusted before the patient left the operating-table, to illustrate its application in view of the surgeons and students present. The splint was then removed until recovery from the influence of the anesthetic. Thereafter it was kept in position, except during necessary irrigations, until the patient was dismissed as cured.

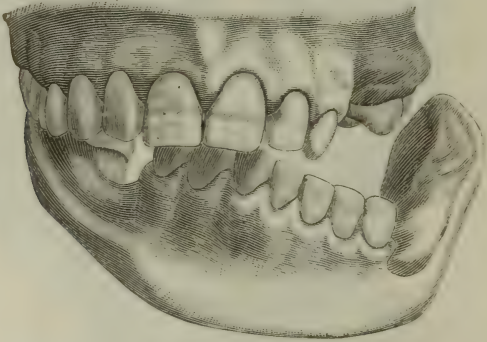
It was a happy inspiration that prompted the preliminary construction of this appliance, as the recovery of the patient was more rapid than ordinary, the splint fitting accurately and keeping the articulation of the remaining teeth continuously normal.

On March 30 the sutures were removed, and on April 16 all the dressings were discontinued by reason of the complete healing of the parts.

The microscopical examination of the tumor demonstrated it to be a spindle-celled osteo-sarcoma.

Fig. 2 represents the resulting deformity. Accurate plaster impressions of all the teeth were obtained, and their articulations were correctly represented by the models. Silk ligatures were attached to each of the remaining inferior teeth, and the ligatures were successively caught on the hook of a "cotton scale" graduated to register ounces and their fractions. By traction on the scale against the retracting or extensive action of all the muscles of the dismembered jaw, the amount of force requisite to overcome the drooping tendency of the jaw (see Fig. 3) was ascertained. The maximum distributed downward or mouth-opening force of which the patient was capable was registered at four pounds and two ounces. The involuntary or habitual tendency of the jaw to drop equaled an average force of a little less than one pound.

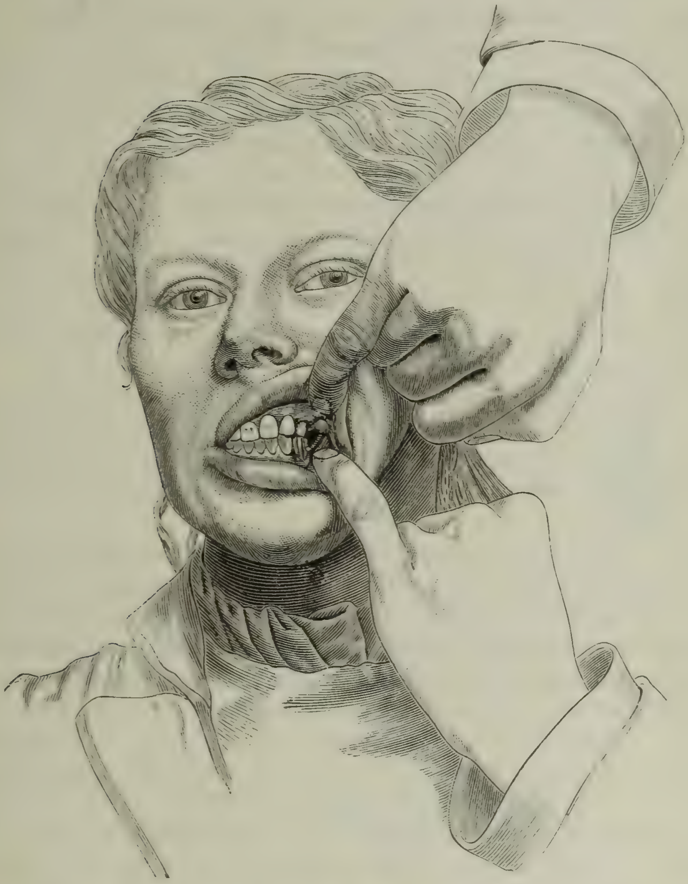
FIG. 3.



An examination of all the accessible text-books disclosed no measurements of the dynamic powers of this group of muscles under like circumstances, and hence I infer the novelty of both theory and practice in the course and constructions adopted in this case.

The first procedure was to fit and adjust upper and lower electrometallic plates provided with retracting spiral springs of gold wire, but this contrivance was abandoned as being too bulky and lacking sufficient tensile strength in the springs to draw the jaw into position and retain it during the process of mastication. Several devices were then tried in various ways, including an inclined plane of steel. The final plan was to make for the superior left molars two gold cap-crowns, which were soldered together, and at their buccal junction there was soldered a stiff and knobbed gold wire projecting downward at an angle of about forty-five degrees. A gold cap-crown was also made for the inferior left cuspid, and to the labial surface of the crown was soldered another short knobbed gold wire extending in the direction of normal occlusion. A steel spring similar to that used in the flexible connection of the dental engine with the hand-piece was repeatedly cut off and tested,

FIG. 4.



until the required resilient power was found in a length of thirty-two coils. This spring was electro-plated, and the looped ends slipped over the knobs on the crowns, which had been previously cemented onto the molars and cuspid respectively. The action of the device was very gratifying, for when the patient closed her mouth the remaining teeth were brought into normal apposition, as represented in Fig. 4, and were so retained by the action of the spring. The great mental depression experienced by the patient in consequence of the awkward position of the jaw (see Figs. 2 and 3) was immediately relieved, and both mastication and speech made easy. The spring can be removed at will by the patient, and if occasion shall require a new one can be substituted without displacing the cap-crowns, which, being accurately fitted and highly polished, are perfectly aseptic.

It was confidently anticipated as the result of this mechanical expedient that the remaining operative muscles would be strengthened and trained to double duty, so that in time the spring could be dispensed with, and a metallic plate carrying a vulcanite "plumper" highly polished could be fitted to fill out the lower integuments and to a great degree remedy the external deformity. Such a plate I have in readiness for insertion.

Six weeks after the operation the patient, assisted by the spring, has nearly overcome the retrograde tendency of the jaw, and, upon removing the spring, can articulate the teeth ; but the muscles are not yet sufficiently strong for the mastication of meat, etc., without the artificial aid.

The precautionary measure of having in readiness the interdental splint, together with the aid of the spring and the intelligent co-operation of the patient in training the muscles, have combined to secure the present success, and there is little doubt of her being ultimately able to forego recourse to the spring, which nevertheless will be available whenever it may for any reason be required.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 625.)

FORMATION OF CAVITY BORDERS.

In considering the edge-line of cavities, I shall make a distinction between the general outline and the actual edge, nominating the one "cavity border" and the other "enamel margin." Both are subjects requiring discussion from different stand-points.

As a general principle, the cavity border must be free from angles,—must be curved. More than this, it should be a continuous curve

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rather than a succession of curves. From an esthetic stand-point, nothing is more essential than that the eye should rest upon a gently curving line, rather than upon an angular or scalloped one. Many operators in their efforts to economize tooth-substance make the mistake of producing results which are unsightly. A small filling with an odd border is more conspicuous than one which may be larger, but which has been placed in a cavity correctly formed. These rules, of course, apply more especially to such fillings as reach the labial surfaces of the anterior teeth. They apply, however, to the molar region also, because in this instance esthetics and durability go hand in hand. To leave irregular borders in any cavity is to produce weakness along the points of contact between the tooth and the filling. Chipping of the margin will occur either during the placing of the filling or later.

Reference to a few special cases will demonstrate the point more fully and clearly. Fig. 31 is diagrammatic, but conveys the idea clearly enough. It is supposed to represent the ragged outline of a cavity in the approximal surface of a central incisor. In Fig. 32 we observe the same, prepared and filled, according to methods too often followed. There are three errors along the border. The cavity has been formed on curved lines, it is true, but they are weak lines and not esthetic. The slight prominence at *a* has been left, thus producing an undulating border, instead of the more beautiful curve seen in Fig. 33. Moreover, if we study the cleavage of enamel we discover that this prominence is weak, since it is unsupported, and must almost certainly crack during the operation of filling. The force exerted in packing gold against it would probably produce fracture along the line of the enamel-rods, and if the disengaged piece did not come away at once it would do so later, or else decay would be invited here. For similar reasons the sharp point at *b* should not have been left. Even if no fracture were produced during the packing of gold, the loss of a triangular segment would invariably follow upon use in mastication. Again, the heavy undercut at *c* is an error, for the strongest gingival border is one formed without undercut of any

FIG. 31.

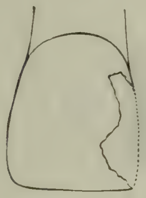


FIG. 32.

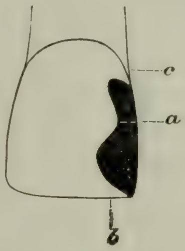
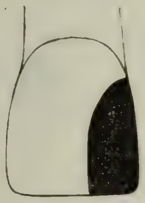


FIG. 33.



kind, but having a flat surface against which force may be freely exerted without fear of chipping. Fig. 33 is correctly formed and decidedly more pleasing to the eye. In Fig. 34 we have another cavity, which is too often incorrectly formed, as seen in Fig. 35. This should have a border similar to Fig. 33. As prepared in Fig. 35 the point *a* is weak. Gold is a soft, malleable metal, and where it is brought to a thin edge, as seen, the impacting force of mastication tends to flatten it out until it curls and breaks, leaving a ragged edge. The point *b* is weak for reasons already given.

FIG. 34.

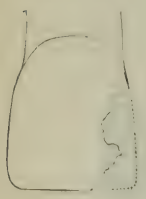


FIG. 35.

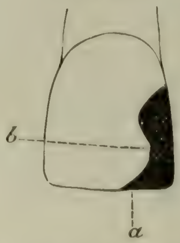


FIG. 36.

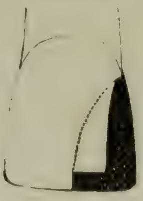
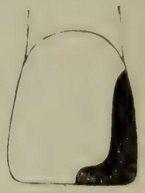


FIG. 37.



As I have made my diagrams to deal with cavities involving the restoration of corners, this will be an opportune place to discuss that particular subject. It has been recommended by recognized authority to form a cavity of this character as shown by the heavy shading in Fig. 36. To my mind this is most unfortunate teaching. We thus get two sharp angles, both of which must become weak points save in the hands of the most skillful, even if this exception be allowable, which is doubtful. In any event the result is far from beautiful. Such a cavity coming into my hands would have been formed as shown in Fig. 33, for the L-like extension is supposed to have been intentionally made by the operator. Once I was called upon to refill a tooth which had been operated upon according to this method, and in that instance I formed my cavity as indicated by the dotted line, Fig. 36, approaching my ideal as nearly as possible under the circumstances. I could have shaped it as seen in Fig. 37, but such a form is so uncommon as to be more conspicuous than that chosen. In Fig. 38 we see a diagram showing two corners contoured. In cases of fracture from falling against a curbstone or from other accident, the corner will usually be lost, the line of fracture being a straight one. A filling placed without alteration of the border would appear as shown at *a*, and the correct border is seen at *b*. Let us consider these two forms aside from esthetics. Suppose that the dotted lines *f*, *f*, give the internal retentive shape of the cavities. The force during mastication, which will tend to dislodge the fillings, will come in the direction indicated by the dotted lines *c*, *c*. The border of the corner *a* being a straight line, it is evident that the retention of the filling, under strain, will be entirely dependent upon the strength of the wall at *d*, of course plus the resistance of the lower undercut. In the other corner (*b*) we have equal strength, plus the resistance offered by a well-defined shoulder at *e*. So that once more we find the curved line stronger, as well as more attractive in appearance.

In cavities such as are shown in Fig. 39, and even where the depredation has been less, it has been advised to remove the natural corner as far as the dotted line *a*, and place a contour filling. The argument is, that the tendency toward cleavage in both enamel and dentine is so great that this corner must be lost sooner or later, so that it is best to fill at once as directed.

This again I think a grave error. Many deductions have been made as to the cleavage of enamel and dentine which are misleading, because the experiments have been conducted upon dried teeth, out of the mouth. Using the chisel upon these, the investigator finds that very little force need be exerted, either to separate parts of enamel along the line of the enamel-rods, or to cleave off slabs of enamel from the underlying dentine. In consequence of this latter fact one gentleman has advised that where the border of decay approaches nearly the gingiva, the narrow remainder of enamel should be chipped away and the gingival edge of the gold allowed to rest against the cementum. It seems to me that this is going to a great and hazardous extreme in following a theory.

FIG. 38.

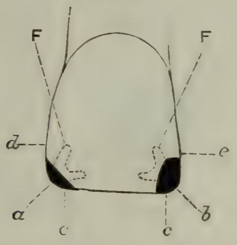
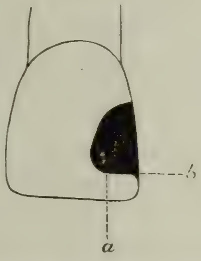


FIG. 39.



The truth is that we do not have to deal with dried teeth in our practice. Therefore if we consider cleavage at all we must study it as we have to contend with it. We are called upon to fill two classes of teeth,—those having living pulps, and those which are partly devitalized because of the loss of that organ. A wholly dead tooth, one in which both pulp and pericementum have died, should invariably be extracted.

In deciding as to the form to be given to such a cavity as we are discussing, it becomes important to determine whether the pulp is alive or dead, and if dead, whether it has been freshly devitalized, or, having died from disease, the tooth-substance has been permeated by putrescent matter.

Supposing that the pulp be alive and the tooth in a state of health, I consider that it would be malpractice to remove the natural corner, and my advice is based upon the result of practice rather than upon theories, which, though apparently logical, often prove unpractical.

The cavity borders should be curved as gracefully as possible without making further encroachment upon the tooth-substance, and the interior so arranged that the filling will be retained from above, and laterally, no dependence being placed upon the weak corner. A slight bevel at *b*, Fig. 39, will possibly serve as a point of resistance against such force as would have a tendency to crack the corner; at least it is preferable to a sharp angle. At the time of so filling a tooth, it is as well to explain to the patient that the corner is weak, and may be broken off in the future; that you are obliged to choose between taking it off and risking future accident; that you follow the latter course to give her the benefit of the doubt and save her from the disfigurement of a larger filling as long as possible; and finally that you have so arranged your filling that if the mishap should occur you can build on more gold, *without removing what you have just inserted.*

By this course it is seen that nothing is lost, whereas, should the fracture occur, *the patient will even then be in no worse predicament than that in which her dentist would place her by the intentional removal of the corner;* if the fracture should not supervene, she would certainly be the gainer. It may be observed that I have alluded to the patient as "she." This is because the force of my argument is greater when dealing with women, who do not wear moustaches, and the marring of whose beauty means more than does that of a man.

Thus it follows that in healthy teeth, whilst I recognize the element of the cleavage of enamel, I have also noted the remarkable strength which may exist in an apparently weak spot, due to the support of healthy underlying dentine, and the tenacity with which the two cohere.

Where a pulp has been freshly devitalized, the tooth being otherwise healthy, the fact that the root-canal offers such excellent opportunity for anchorage that it would be absolutely certain that future damage could be repaired without removal of the initial filling, would lead me to follow the same method.

Where a tooth comes into my hands in which a pulp has been long dead, the substance of the tooth discolored and evidently friable, it then becomes a subject for special consideration. In the diagram I have shown the limit at which I should hesitate. Where the decay had proceeded farther so as to make the corner weaker than here shown, I, probably, should remove the corner. To determine whether to do so or not, place a *dull* instrument against the corner and exert pressure. If cleavage occurs under such strain, the dentist need have no doubt that he has followed a proper course. A few gentle taps with a mallet might even be resorted to, and if a crack should appear, the corner should be removed.

There is one other condition when it is not only advisable but imperative to remove the corner. Having determined not to do so, suppose that the operator proceeds to pack his gold. Reaching the weak spot, he abandons the mallet and uses hand-pressure. In spite of this precaution, a crack suddenly appears along the line of cleavage. The corner should be removed at once, whether the tooth be healthy or otherwise.

To emphasize the above arguments, I may state that an examination of my records shows that I have filled hundreds of such teeth in the manner here advised, and that in only two instances have the corners broken away afterward. In both cases the contour was restored without removal of the filling. I have also a few times repaired broken corners without removing the original filling, where the patients had been in other hands before coming to me.

FIG. 40.

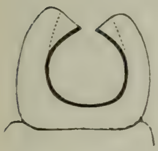


FIG. 41.

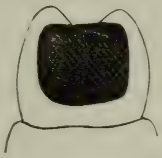


FIG. 42.

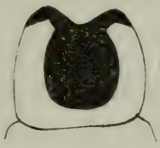


FIG. 43.

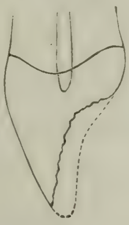
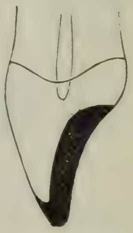


FIG. 44.



The economist of tooth-substance frequently makes a mistake in forming cavities in the approximal surfaces of molars or bicuspids. In such a cavity as is shown in Fig. 40, he shapes the cavity as indicated by the heavy line. Operating between separated teeth, with the little space which we usually have, it is plain that he is at a great disadvantage as soon as his filling is half completed. He is then obliged to fill places which it is almost impossible for him to see. It would be much better to extend the border to one or both of the dotted lines, as might be required to gain ready access to the cavity at all parts.

In the masticating surfaces of molars no special directions are necessary, beyond advising the use of a rose-bur along the sulci, large enough to allow the entrance of a plugger if gold is to be inserted, and larger still where amalgam is to be used. It is a mistake to cut out sulci with small burs, and then fill with amalgam. The opening all along the line should admit a small ball-burnisher, so that in packing the amalgam the mercury may be thoroughly expressed. Many amalgam fillings have failed because of tiny burs having been used at the extremities of the sulci, so that when placing the amalgam these points were improperly filled, either with material having an excess of mercury, which on that account has never set, or with an insufficient quantity dragged or wiped into the crevice with the cotton, spunk, or bibulous paper used for smoothing the filling. If a fair-sized rose-bur is used, all corners will be well rounded and accessible. It will sometimes happen that by following two nearly parallel sulci to their extremities we leave between a narrow strip, which, if left, is apt to crumble under the blows of the mallet. In such cases the intervening bit should be cut out, and the two sulci thus united.

In a few rare instances the border of a cavity may be so placed that a filling becomes a support to a frail wall rather than dependent upon it. A case from practice will well explain this. A patient once came into my hands having a first bicuspid which was positively black. This was before the days of the perfection of artificial crowning. Examination showed the tooth to have been filled with amalgam. The cavity occupied a large space directly through the tooth from the anterior to the posterior approximal surface. Fig. 41 shows how the dentist had formed the cavity. It will be seen at a glance that the filling offered no support whatever to the weakened walls. On the contrary, in mastication, a piece of food acting as a wedge between the cusps would have a tendency to drive the labial and palatal walls apart and away from the filling. A slight elasticity of the dentine allowed this. Thus the filling leaked badly, and discoloration was largely due to decay between the amalgam and surrounding dentine. Great care was required to remove this filling, but when accomplished, and all the decay removed, the tooth was far from being unsightly in color. I filled this tooth with gold, anchoring the filling in the root-canal, and so shaped the borders that the filling became a strong and complete support to the walls. This is shown in Fig. 42. It is plain now that all mastication must be upon the gold. The ends of the cusps have been removed and the upper extremities of the remaining walls strongly beveled, so that the gold built over them holds them firmly from any tendency to bulge outward.

Similar treatment is required in cases shown in Fig. 43, where abrasion against the lower teeth has worn away the palatal surface of the upper incisors or cuspids, leaving frequently a knife-edge. This incising-edge should be ground down to a well-marked bevel and gold contoured over it as shown in Fig. 44.

ENAMEL MARGINS.

A great deal has been written and preached upon this subject, and, as in other matters, the theorist has advanced several erroneous propositions. The desideratum in all fillings is that when polished the line of contact shall be as fine as a hair. Examination with a jeweler's lens should not reveal any marked raggedness. Considering the arrangement of the margin from this aspect alone, there is but one method of producing the result desired. The margin must be smooth, and at a right angle to the outer surface of the tooth, in all cavities save those in masticating surfaces. These latter will be discussed separately.

In Fig. 45 we see a section through a central incisor and contoured gold corner. The margin at the labial surface *a* is a sharp right angle, as is also the margin on the palatal side. In filling we of course lap our gold well over the margin, and then trim away, seeking a sharp edge line. Any method of polishing which scrapes *across* the margin will deceive as to the true edge. That is to say, it is an error to use stones, polishing wheels, or sand-paper in disks or strips, revolving the same around the tooth from one approximal surface to the other. This method may be employed at the outset to remove the excess of gold; but when it becomes necessary to polish away the last remaining overlap, in order to reveal the true margin and leave a beautiful fine line, the polishing must be done along the length of the margin, from the incisive edge toward the gum. If it is an approximal cavity I prefer fine sand-paper disks, pliable enough to bend readily, though stiff enough to cut well. Revolving the disk rapidly as described, the edge of the disk is made to approach the edge of the gold; if the latter is overlapping the margin, the disk attacks it instantly and removes sufficient to perfect the edge, leaving gold and tooth-surface exactly flush. The same result may occasionally be expected from the use of a fine polishing-stone (Arkansas or Colorado stone, not corundum), but it must be fine enough not to cut enamel, and must cut gold very slowly. Margins of fillings along the palatal angle may best be polished with fine disks, but where the border reaches the concaved surface small stones revolving from incisive edge toward the gum best attain the finest finish. A stone turning in this direction will not catch in the dam.

FIG. 45.

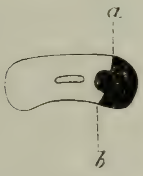


FIG. 46.

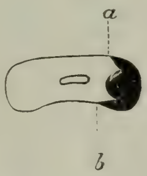
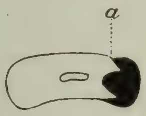


FIG. 47.



If approximal margins be beveled outwardly (Fig. 46), as some contend is requisite, it is plain that we no longer have a really defined margin at *a* or at *b*, but simply an obtuse angle along a receding slope. If this were really an obtuse angle, it would be bad enough, but it is almost certain that the operator will produce a rounding bevel, so that there is really no distinct margin at all. Now if gold be lapped over this, how shall it be polished so as to obtain a strong edge to the filling and a neat, sharp marginal line? The answer must be, that it is impossible. The cross-motion of a polishing instrument will not always expose the true edge even where the margin is a sharp right angle, and it is less apt to do so along a bevel. If the disk or stone is used as has been described to be the best method (revolving along the margin), the first effect will be to produce a scalloped line, and if the operator then attempts to straighten out that line, he removes the edge of the gold, so that a portion of the beveled enamel is uncovered, leaving a slight groove along the length of the tooth next to the filling. Fig. 47 shows a section through a tooth and filling after such a mishap, the exposed bevel resulting in a groove showing at *a*.

This idea of beveling is much more frequently advocated at the gingival border, through a strange impression that the margin which has gold lapping over it will better resist caries than where the gold is brought against it in sharp contact, without overlapping. Where such a beveled gingival margin is polished with either sand-paper strips or the approximal trimmer, the groove described is most likely to occur. If the disk alone is depended on, the overlapping gold will be left with a ragged edge in ninety per cent. of cases. If the margin along the gingival border has been formed with a sharply-defined angle, and the enamel is supported internally by dentine, which has not been erroneously cut away for anchorage, then gold may be packed solidly against and over it, and in polishing the approximal trimmer may be freely used until it no longer catches, when a fine sand-paper strip will finish the marginal line as fine as a hair.

It has been wisely argued that the enamel margin should not assume an acute angle, for the reason that the enamel at the extreme edge being unsupported by dentine, will be likely to crumble during the operation of filling, because of its tendency to cleave. For this reason it has been advised that the enamel margin should assume the direction of the enamel-rods at the point operated upon.

Thus theory as well as practice, and mechanics, recommends that the enamel margin should cut the surface of the tooth at a right angle, for it is usually true that the enamel-rods are arranged perpendicularly around the dentine, so that they must assume almost if not quite right angles to the surface.

If we examine the varying surfaces in the masticating portion of a molar or bicuspid, it becomes plain that to follow the rule here and arrange the enamel margin so that at all points it shall be a right angle, would be to undertake the impossible. Neither is it necessary, for whereas in approximal and surface fillings we are compelled to finish the gold down flush with the true margin of the cavity, in molars and bicuspids the sulci being depressions which we wish to eradicate, as well as to simply fill the cavity proper, we customarily extend the gold beyond the true cavity-edge, partly obliterating the natural depressions. If a filling so placed is well burnished and any ragged edges trimmed off, the form of the margin need give little concern, since it is entirely covered. Overlapping in masticating surfaces is not objectionable, because, whilst the gold may spread out, here as elsewhere, it is in such a position that all the force exerted simply presses it more tightly against the tooth-substance which it is intended to cover and protect.

(To be continued.)

FORCIBLE PROTRUSION OF NON- OR PARTIALLY-ERUPTED TEETH.

BY EDWARD H. ANGLE, D.D.S., MINNEAPOLIS, MINN.

THE partial or complete failure of a tooth to erupt frequently necessitates the employment of a corrective appliance. In dental literature a number of appliances are put on record as accomplishing the forcible protrusion of teeth, the power being derived from screws, springs, or ligatures. All of these devices are similar in that they are anchored by means of plates, "cribs," or clasps attached to the same arch which contains the malposed teeth; while the appliance here shown derives its anchorage by being attached to teeth in the opposite jaw, all plates, "cribs," springs, etc., being discarded, thereby rendering the appliance simpler, more compact and cleanly, besides making it far more agreeable to the patient, without in any degree lessening its efficiency.

FIG. 1.

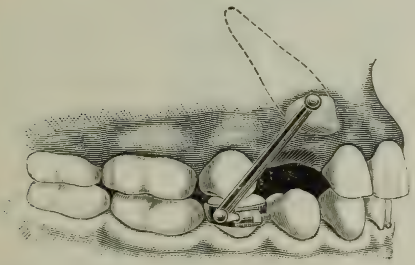


FIG. 2.

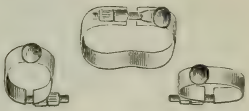


Fig. 1 shows the principle of this device as applied in the treatment of a very common form of irregularity, in which the temporary cuspid had been retained too long, causing the permanent cuspid to erupt forward of and above its proper place. In this instance the temporary cuspid was extracted and the lower second bicuspid was encircled by a clamp-band, to which had been soldered a short pin with smooth, round head. (See Fig. 2.)

A very small hole was drilled into the cuspid and a short pin was set with thin cement. A common pin answers the purpose very well, and the hole need not be any deeper than the enamel, if the pin is accurately fitted to it. A rubber ligature was given the patient, with instructions to slip it over the pins, as shown in the engraving, Fig. 1. The ligature tends to keep the teeth in occlusion. The anchor-tooth is directly opposed by the superior bicuspid, and supported by the inferior first molar and first bicuspid. It will thus be seen that this anchorage is the simplest and most efficient possible to obtain.

The ligature should be worn at night-time only, so as not to interfere with speech and mastication, although some patients wear it more or less continuously.

A too strong ligature should not be worn, as it might endanger the life of the pulp, but gentle traction should be used, gradually directing the tooth downward into its proper position.

This simple appliance will be worn without complaint by the patient as long as it shall be found necessary.

I prefer cutting the ligature from heavy rubber-dam, as suggested by Dr. Black several years ago; or from thin rubber bands, such as are used for holding packages of paper together, first punching a hole with the largest size of the rubber-dam punch, and afterward cutting the outside down to the desired strength with scissors.

The direction of the force to be exerted upon the tooth to be moved will, of course, indicate which tooth in the inferior arch should be selected for anchorage, and also determine the point on the band to which the anchor pin is to be soldered. Should the anchorage fall upon a tooth with no antagonist, there would, of course, be danger of loosening it.

Fig. 3 shows such a case, in which the anchorage was modified to suit the condition found.

The case was that of a young lady seventeen years of age. The deciduous cuspid had been retained too long, causing the permanent cuspid to become imbedded in the alveolar process on the lingual side of the lateral incisor, thus necessitating complex movements of the tooth,—backward, outward, and downward,—requiring a very firm anchorage, which was gained by encircling the inferior cuspid and second bicuspid with bands, having delicate tubes attached to their labial surfaces. A piece of gold wire of the proper length was provided, the ends of which were bent at right angles and slipped through the tubes upon the anchor teeth, as shown in the engraving (Fig. 3). The wire fitted the bores of the tubes so accurately that in cutting off the ends which emerged through them, each end spread sufficiently to prevent its coming out. A pin was soldered to the wire about midway between the pipes and one cemented in the cuspid cusp, as in the case first described. When the ligature was stretched from pin to pin, as seen in the engraving, the anchorage teeth, two in each jaw, were thus made to oppose the cuspid to be moved.

FIG. 3.

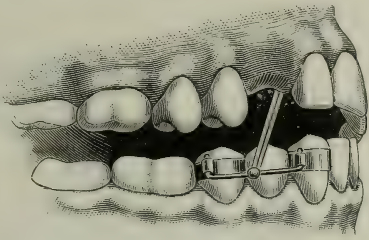
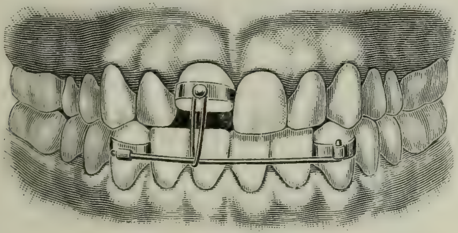


Fig. 4 shows another modification of the latter method of anchorage. The anchor-wire was made detachable, and the pin dispensed with, the patient slipping the wire through the ligature and into the pipes upon retiring, and removing it during the day, as the ends of the wire had not been spread. A delicate band, bearing a pin on its labial surface, was cemented to the tooth to be moved.

FIG. 4.

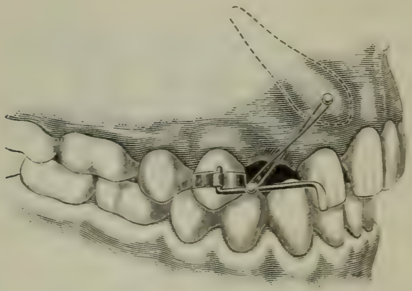


Another very useful purpose for which these anchor-wire bands and pipes may be used, as shown in the engraving, is as a splint for supporting teeth that have been loosened by salivary calculus or have been transplanted, replanted, or implanted. The teeth to be fastened should be bound or ligated to the splint.

Fig. 5 shows a case in which the appliance used was very similar to those before described, but this anchorage was attached to the teeth in the same arch in which was located the malposed tooth.

The appliance in detail is as follows: The first bicuspid was banded and a pipe soldered to the labial surface of the band, in which was hooked the piece of the gold wire, the other end being bent so as to rest on the cutting-edge of the lateral incisor. A pin was soldered to this wire, as in the case before described, and a delicate ligature was then stretched from pin to pin, thus exerting a gentle but constant traction. With this appliance the ligature is worn continuously. In some cases where much force was necessary I used advantageously the combined anchorage herein described. The delicate ligatures shown in the appliance last described were used in the daytime, to assist the action of and constantly retain what had been gained by the more powerful anchorage on the lower teeth acting during the night.

FIG. 5.



MANAGEMENT OF DENTAL SOCIETIES.

BY EUGENE S. TALBOT, M.D., D.D.S.,

PROFESSOR OF DENTAL SURGERY, WOMAN'S MEDICAL COLLEGE, AND LECTURER ON DENTAL PATHOLOGY AND SURGERY, RUSH MEDICAL COLLEGE.

(Read before the Chicago Dental Club, May 25, 1891.)*

HAVING been a close observer of the workings of dental societies in local, city, state, national, and international meetings for the past twenty years, I wish to make known to this society some of the impressions made upon me, pointing out some of their noticeable defects, and by so doing suggest a means for their correction.

Dentistry to-day is not as it was thirty or forty years ago. The majority of those who were then in practice were men without diplomas, and what little knowledge they possessed had been acquired from the few dental books then in use. Their manipulative acquirements were empirical, or were obtained in the office of an older practitioner, whose ability as a teacher and operator was often questionable.

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* Since this paper was written, a very able paper by Dr. Joseph King Knight has been published in the *International Dental Journal* for January, 1891.

To-day, with our state laws and with our dental colleges, no one is allowed to practice without first obtaining a diploma from a dental college, or passing a creditable examination before a state board of dental examiners. Dental societies were established in cities, counties, or states for the purpose of demonstrating and discussing different modes of operating. The men who were ambitious to compete with their fellow-practitioners, or to excel in manipulation, would attend these meetings in order to become familiar with the operations then performed. At those meetings the numbers were small, so that those who attended had no difficulty in obtaining a view of the operation from its beginning to its completion. Great care was exercised to secure men who excelled in a particular operation, thereby offering an inducement for members to be present.

Now, with college instruction, with the large number of text-books, and the general knowledge of operations which are positive and are or should always be performed in the same way, there are very few operations that the average practitioner would care to see performed. If we glance through the programs of the majority of dental societies, we shall observe that Dr. Smith will insert an amalgam filling ; Dr. Jones will demonstrate his method of filling root-canals ; Dr. Sawyer will insert an approximal gold filling, or will demonstrate his method of inserting a gold filling with a matrix ; Dr. Wells will demonstrate his method of destroying pulps with arsenic and without pain. Is there a graduate about to start in practice, or a practitioner, who does not know how to perform these operations? How would it look to pick up a program of a medical society and read, "Dr. A. will show his method of writing prescriptions ; Dr. B. will demonstrate his method of diagnosticating a case of pneumonia by percussion and auscultation ; Dr. C. will demonstrate his method of using the stomach-pump ; Dr. D. will amputate an arm and thigh"?

I am of the opinion that a majority of the members would remain away from the meeting whose program was like the above.

Occasionally a demonstration is so unique and novel that all are anxious to observe the operation in all its details ; the meeting is largely attended, but the opportunities for observation are so meager that only a few, if they are selfish and strong enough to hold their position, are able to observe the details. The majority of those present, many of whom have traveled a long distance to witness this particular operation, are unable to obtain the slightest glimpse of what is being done, and of course leave the meeting much disappointed.

Another point to which I wish to call attention is the character and discussions of papers. A report, for example, is read upon dental implantation. This report is an excellent resumé of the work accomplished up to date upon this subject. Then follows the discussion. Dr. A. states that he has performed a number of operations with teeth that had been taken out of the mouth a year ago or more, and after thirteen months he was able to say they "seemed to be successful"; Dr. B. removes all the periosteum, and has had splendid success; Dr. C. never removes the periosteum, and always has success; Dr. D. cuts off the ends of the roots, and is always successful; Dr. E. leaves the ends of the roots, and all his cases do well; Dr. F. believes there is bony union; Dr. G. believes there is a new peridental membrane formed, and Dr. H. thinks the roots are absorbed and a deposit of bone-cells takes their place. Each guesses the physiology and physiological condition, and the result in each case is merely theoretical. There has not been a particle of scientific investigation to ascertain what actually had taken place, and after spending the whole session the meeting adjourns without a single point having been made.

Again, whole sessions are taken up by gentlemen who have been in practice from twelve to forty-five years, in discussing the subject of root-fillings. Each has his particular method of operating, and each is equally successful. When the subject is finished, there is a feeling that nothing new has been learned, and every person attending the meeting goes away feeling that his particular method is the best after all. The views expressed by the persons who discuss the paper are of mere observation, and not of downright scientific investigation, and therefore of no value whatever, for no new facts have been produced. On the other hand, a paper is read to which the essayist has devoted all his spare time outside of office hours for twelve years. After its reading, Dr. A. rises and offers a resolution which it takes one-half hour to discuss and pass, during which time the thought of the paper is lost and it falls flat. It is a frequent occurrence that the proceedings of a society are interfered with by some one who on the spur of the moment wishes to offer a resolution. It not unfrequently happens that this resolution has not been well considered, and interferes with or is antagonistic to one that has already been passed.

Having pointed out some of the defects, one of the objects of this paper is to show how these may be avoided, and how more benefit may be derived from attending these meetings. A valuable paper was read upon this subject by Dr. Atkinson at the meeting of the Brooklyn Dental Society, February 24, 1890, in which he sets forth many ideas which are very valuable and should be adopted by all societies. Most of the points brought out in that paper I heartily indorse. There are some which were not touched upon, and these I will now present for your consideration, and some of those which were expressed I will place before you in a different form, hoping thus to be able to draw out a discussion of them, and that some at least may be adopted.

Dental societies should be organized as they are at present, but should be graded, and the method upon which they should be managed should be in graded form. Each should have its particular line of work to accomplish, thus avoiding clashing, and at the same time accomplishing for each society all that could be expected. The program of a society should be prepared according to its grade : thus, for the local city or town society we should naturally expect to instruct the young men how to preside at meetings, and have them become familiar with parliamentary rules. They should learn to write and read papers and discuss them, and should attend clinics ; this should be a school of general instruction, where all new ideas and appliances are developed before the eyes of the members.

In this class of societies the clinics should consist of new methods of operating and demonstrations of new appliances. It is quite impossible, even in the local societies, at the present time to demonstrate an operation or an appliance so that all may become thoroughly familiar with its minutiæ, and therefore the committee should divide the members of societies into classes.

I claim that any young man who has graduated from a dental college and does not know how to fill roots of teeth, insert amalgam fillings, make applications to destroy pulps of teeth, and all the operations that come under the ordinary line of the practice of dentistry, should be returned to the dental college and instructed in that particular branch until he is proficient.

It would be just as reasonable to turn a medical society into a clinic for the purpose of demonstrating the method of writing prescriptions, amputating limbs, and the like. I see no object in clinics except for the purpose of demonstrating something new, and this should be done in the local dental societies. If by the aid of clinics all dentists would discard unreasonable methods and adopt feasible ones, so that the method would be universal, then I should heartily recommend the demonstration in all our societies ; but this has never been accomplished, nor will dentistry ever be practiced upon fixed rules until the teachers in our schools assemble and formulate a fixed plan for the methods of teaching and demonstrating. There is no specialty in medicine in which this can be so well carried out as in the practice of dentistry, because, unlike other specialties, most of our operations are positive in character. The preparation of a cavity, treating and filling roots of teeth, applications to the teeth and gums, insertion of amalgam fillings, are the same as making wagon-wheels, sewing-machines, steam-engines, which are made in the same manner the world over. Occasionally an improvement is made in these machines, and in order that others may compete in the market with the new construction, they must adopt the identical method or improve upon it.

These demonstrations should be encouraged in local societies and post-graduate schools, for the purpose of inculcating the new ideas. They should be conducted in small classes, in such a manner that each member or student can make the demonstration under the supervision of the teacher, or it should be so clearly demonstrated that all are perfectly familiar with it. The state, national, and international societies should be conducted in quite a different manner. Demonstrations should be entirely excluded from these bodies. They should be entirely scientific in their character. The time which is now devoted to clinics might be set aside for social intercourse, and so relieve the mental strain, at the same time affording opportunity for becoming better acquainted with our confrères. For this purpose our national societies should always meet at one place, where arrangements should be made for permanent quarters. In connection with a hall there should be established reading-rooms and libraries, which should contain all the leading dental and medical journals. This room might also be used for social intercourse. A museum should also be connected with it, in which all the physiological, pathological, and anatomical specimens, models, and everything pertaining to dentistry might be deposited. All the cities in the United Kingdom, as well as other countries, have large collections of material which are of interest to dentists. It seems hardly possible that we in America, who have made such strides in dentistry, should not possess a museum which, while not equal to our advancement in operative dentistry, should be at least equal to many of the museums in Europe. A well-filled museum would alone be an attractive feature to the practitioners in the different parts of the country. It is possible that the national medical societies would club together with the dental and arrange such accommodations.

Politics seems to be the all-important business in some of our societies. There is one way in which this could be avoided. The officers of the meeting could consist of a chairman, secretary, treasurer, and executive committee. Under this arrangement the offices would be of so little importance that there would be no ambition displayed to fill them. Much time is spent in discussing what is called business, which when seriously looked into is really of no importance, and this is often a pet hobby of some one who has not a scientific idea, and takes no interest in the paper, but who is always seeking an opportunity to display his knowledge of parliamentary rules. This matter can be easily arranged in three ways. First, by setting apart certain hours and devoting the time to that particular line of business, and under no circumstances allowing it to come up at any other time ; second, by appointing a judiciary council, consisting of three, seven, nine, or thirteen of the oldest members, to take charge of all the business of the meeting, and allowing nothing of a business character to come up at the general session ; third, the plan suggested by Dr. Atkinson, "The business committee should be part elected and part appointed. Perhaps seven members would be a proper number, of whom three would be appointed by the chair and four elected ; the appointees to serve during the official term, and those elected to serve under the first election for one, two, three, and four terms (a report each six months is suggested, making two terms for the business committee in each year, and the eventual elective service of each member two years) ; subsequent elections to place a committeeman for four terms as each expired. This would provide for some experienced members being always on the business committee."

Papers to be read in state, national, and international societies should be of a scientific character. Many dentists do not seem to understand what constitutes a scientific paper. We have much to learn from our brothers across the water in this respect.

There is more time spent in dental societies listening to long-ago worn-out methods and theories than is necessary. One scientific paper which has taken ten years for its preparation, and which contains solid facts, is worth more and will give the author more credit than one paper of guesswork each year for ten years. It was said two or three years ago that the profession had written itself out. In answer to this remark, Dr. James W. White in an editorial called the attention of the dentists to a number of subjects about which very little is known, and to obtain facts upon which would require years of study, thought, and experiment, and would necessitate research in the realms of medicine, evolution, and biology. After a scientific paper has been prepared, it should be turned over to the executive committee, whose duty it should be to publish a sufficient number of copies to distribute among all the members of the society at least one month before the meeting. This would give all an opportunity to prepare themselves, and all would then be able to speak intelligently upon the subject. The society does not exist whose members can upon the spur of the moment discuss a truly scientific paper. On the other hand, what benefit can the essayist derive from presenting before a society a paper which has taken him ten years to prepare? He knows what the paper contains before he reads it, and the only object in reading it is to obtain favorable or unfavorable replies to his argument ;

if he is unable to obtain these, he becomes disgusted with the proceedings and will not present another paper.

I presented a paper before the First District Society in New York, in January, 1889, upon the subject of "Fallacies of Some of the Old Theories of Irregularities of the Teeth." Two months before the meeting copies were sent to all the leading men in the country, who were also invited to be present and discuss the paper. The discussions, which were the ablest I have ever listened to, consumed three out of four sessions of the meeting. This plan is the only one that will ever become satisfactory to the essayists and members present.

In 1893 a large gathering of dentists will take place in Chicago. This will be no ordinary gathering of men, and it would seem fitting at that time to do something for American dentistry that will be a lasting monument to commemorate the great event. I would suggest that arrangements be made in some large city in this country, either in connection with national or local medical societies, or independent of these, to permanently establish a building sufficiently large for our national meeting, and also a reading-room and national museum.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Concluded from page 663.)

THIRD DAY—(Continued).

DR. J. S. MARSHALL read a paper entitled

THE RHEUMATIC AND GOUTY DIATHESIS AS MANIFESTED IN THE DISEASES OF THE PERIDENTAL MEMBRANE,

of which we give an abstract, as follows :

He said nearly all text-books on dental pathology and surgery mention that rheumatic and gouty individuals are liable to suffer from irritation of the peridental membrane, causing the teeth to become more or less sore and loosened in their sockets, presumably the results of that diathesis.

Clinical and post-mortem experience teaches that the *materies morbi* of these diseases has a predilection for the fibrous structures of the body, especially the synovial membranes, the aponeuroses of muscles, the dura-mater, the cardiac tissues, periosteal and peridental membranes. The one most commonly affected is the synovial membrane, resulting in inflammatory conditions of the joints.

It not uncommonly happens, however, that there is associated with the inflammatory phenomena of the joints enlargement of the long bones and nodular formations in other localities; and in the pericementum, conditions which are somewhat analogous.

The predisposing and exciting causes of certain irritative conditions of the pericementum seem to have their origin in the same conditions which bring about the phenomena of gout and rheumatism, and they have also proved by experience to be amenable, in many cases, to the same specific treatment adopted in these diseases. This last fact had led him to the belief that the rheumatic poison is largely accountable for many of the diseased conditions of the pericementum, and had induced him for several years to make close and careful observation in relation to the prevalence of irritation of the pericementum in gouty and rheumatic individuals. This belief had been further strengthened by finding, upon analyzing the urine of a number of persons suffering from peridental irritation of this character, that there was a considerable excess of uric acid in every case. The saliva also, in many cases, gives a decided acid reaction.

The peridental membrane seems to be very susceptible to the irritating effects of an acid condition of the blood, whether from an excess of lactic or uric acids retained in the system or from the ingestion of such acids as are found in sour wines and malt liquors.

The habitual use of sour wines and malt liquors often results in peridental irritation of a marked character in individuals who have never developed symptoms of a rheumatic condition; while on the other hand the same irritative conditions are found in total abstainers; but these, it would seem, are due to rheumatic phenomena, and are often the forerunners of an approaching attack of acute articular inflammation.

Congestion and thickening of the peridental membrane and temporary loosening of the teeth, accompanied with dull, gnawing pains and more or less soreness, are a common occurrence in rheumatism and gout. At times this condition is the first definite symptom to be manifested of an approaching attack of acute articular inflammation, while in others it does not make its appearance until after the first acute symptoms have subsided, and occasionally it is the only manifestation of this peculiar diathesis.

Chilling the surface of the body, or in other words taking cold, is usually the exciting cause of an attack, while an injudicious diet greatly aggravates it.

The presence of concretions upon the roots of the teeth is the most common cause of inflammation of the pericementum, and it has been generally supposed that these concretions were formed from the saliva.

He desired to call attention to what seemed to him to be a more rational explanation of the formation of these deposits in locations inaccessible or nearly so to the saliva. The saliva contains, as waste products, a certain amount of phosphate and carbonate of calcium, which have been rendered soluble by the action of carbonic acid. A certain amount of ammonia is given off from the lungs as a product of decomposition of tissue; while fermentation of alimentary débris lodged about the teeth also furnishes an additional amount of ammonia. This ammonia coming in contact with the saliva of the mouth unites with a portion of the carbonic acid to form carbonate of ammonia, thus liberating a portion of the calcium, which is thrown down in the form of a precipitate and lodges upon the exposed surfaces of the teeth. But when deposits occur at remote points from the gum-margin, it does not seem possible that this is the correct explanation of their presence in these locations. The law of gravity carries downward all bodies that are heavier than the medium in which they are suspended, consequently we must look for some other explanation for the presence of the deposits on the roots of the superior teeth.

Capillary attraction may possibly account for their location, but this seems hardly probable, for it presupposes the presence of a pocket, or a separation of the pericementum from the cementum, while the amount of saliva entering such an existing *cul de sac* would be extremely small, and not likely to be changed at sufficiently frequent intervals to account for the rapid accumulation which takes place in some of these cases. We are forced, therefore, to the supposition that they are deposited from some other source, and under an entirely different group of circumstances.

It has been suggested by Dr. Ingersoll, of Keokuk, Ia., that these concretions were a direct deposition from the liquor sanguinis which bathes the roots of the teeth during the suppurative stage of the inflammatory process. This may be the correct solution. It is true that calcareous material is sometimes deposited from pus, in proof of which might be mentioned the fact that the roots of teeth penetrating the antrum of Highmore and foreign bodies located in this sinus during suppurative inflammation have been found when removed to be covered with calcareous deposits; but that this is a common occurrence in suppurative conditions in any locality, admits of serious question. He was of the opinion, however, that the deposition of the concretions upon the roots of the teeth, in those localities not readily reached by the saliva, or in which the presence of the saliva would be an impossibility, is due to the causes which produce the chalky formations found in the joints and fibrous tissues of gouty and rheumatic individuals.

The thought had occurred to him, though he had not had time to demonstrate it positively, that the concretions found upon the roots of the teeth in the locations just named were masses of urate of soda with phosphate and carbonate of calcium, and that they are deposited directly from the secretions, as is often the case in rheumatic arthritis.

Furthermore, it would seem that these concretions were the cause of the inflammatory condition, rather than the result of it. In proof of this, he stated that clinical observation teaches that suppuration often occurs about the roots of the teeth at remote points from the gum-margin, which points have no outlet until the pericementum is dissected from the roots of the teeth by the accumulation of the pus. He had seen cases in the lower jaw in which an abscess had been formed upon the roots of living teeth,—between the neck and the apex,—and in which the attachment of the gum at the neck of the tooth was intact and the pus did not escape until nature had perforated the soft tissue, or relief was given by the use of the knife. In such cases he had never failed to find concretions upon the root at the point of suppuration ; this could not possibly have been deposited from the saliva, and it is fair to presume that the deposits upon the root were the source of irritation that produced the abscess, rather than that the inflammatory condition was produced by some remote cause and the formation of the deposit the result of the inflammation.

Dental exostosis, or hypertrophy of cement-tissue, is an occasional occurrence in individuals of a gouty or rheumatic diathesis. It is most commonly found in chronic cases of long standing, and is often associated with enlargement of the joints.

The causes are in all probability the same as those which produce the enlarged joints. Chronic irritation of the periosteum tends to hypertrophy of bone ; while the same condition of irritation in the pericementum produces hypertrophy of the cementum. The history of these cases is usually one of chronic irritability of the pericementum with periodical attacks of soreness and looseness of the teeth, while the cause of each attack is generally referred to some recent exposure in which the individual has taken cold. The acid reaction of the saliva and the urine at these times gives evidence of an acid condition of the blood. This would seem to indicate the cause of the irritation and suggest the line of treatment to control the immediate symptoms and the prophylaxis of the future.

Phagedenic pericementitis is sometimes directly traceable to a rheumatic condition of the system, or the uric-acid diathesis. In several cases in which he had analyzed the urine, uric acid was found largely in excess of the normal quantity.

In all of the cases which he classed as rheumatic, concretions were found upon the roots of the teeth, and many times in locations which precluded the possibility of a salivary origin.

Under restricted diet in which meats, wine, and malt liquors are cut off there is soon a marked diminution of the quantity of uric acid excreted, and an equally marked improvement takes place in the symptoms manifested in the oral cavity, which cannot be accounted for by the removal of the concretions and local treatment alone. In one case which had been under observation for four years, the periodical aggravation of the oral symptoms is a sure indication of the presence of an excessive amount of uric acid in the urine, and as soon as this condition is corrected the inflammatory conditions of the pericementum are greatly relieved. Local treatment is necessary, but this alone is not sufficient : we must strike deeper and correct the morbid condition of the system if we hope to effect a cure.

He believed that if observations were carefully made it would be found that the facts and opinions presented warrant the opinion that gout and rheumatism are important factors in the production of a considerable variety of irritative conditions of the peridental membrane.

Discussion.

Dr. J. L. Williams concurred with the belief that local treatment will not cure such cases as described in the paper.

Dr. Noble had long thought they must seek for something more than a local cause for such deposits. In the future he should study cases presented to him with more interest, and examine for systemic causes and try systemic treatment for cure.

Dr. Whitefield said he had had a case of a lady who had perfect teeth, but was afflicted with recurring trouble with the gums ; they would become raw and suppurate. The lady was of decidedly rheumatic diathesis, and the trouble about the teeth would coincide with the manifestation of rheumatic trouble.

Dr. Taft said the deposits on the roots of the teeth between the tooth and the tissues around it are found in various forms ; they are usually more dense than ordinary salivary calculus, always darker, though they rarely become black like salivary calculus sometimes does. The tissue will not unite over it, and while it remains it will cause disease of the gums. There is no indication that it comes from the saliva. He did not doubt that it came from the liquor sanguinis. How the deposit first occurs is not easily understood. It would seem that there must be an irritant to determine the location. It appears to be a sequence to a diseased condition, and when it begins to be deposited it causes irritation. It forms a pocket where matter is retained which becomes more and more vitiated.

The deposit must be removed before there is any possibility of cure, and this must be done by instruments or by the extraction of the tooth or teeth affected. The system may be improved by appropriate remedies, but this will not remove the deposit. Sometimes it is very difficult to remove it, as when it is confined to the end of the root and the attachment of the tissues to the tooth above it perfect. It may even be confined to the space between the roots of a molar. If there is a pocket running down, the deposit may be removed by an instrument ; but where there is no pocket or where the deposit cannot be reached, the tooth will have to be extracted. He had seen a molar extracted that had the space between the roots filled with this deposit. It had been treated by a good operator, a man well qualified to handle any case, but the tooth had to be extracted. What else can we do with such cases? Is there anything that can be done in the way of prophylaxis? What is the incipient indication of trouble of this kind? What course can we advise to avoid it?

Dr. Whitefield said that in the case he mentioned there was no deposit, only recurring inflammation, and asked whether this disease attacked pulpless teeth more than those with living pulps.

Dr. Marshall had never noticed that pulpless teeth were more or less liable to attack than others. The concretions are found at the ends of the roots, with no opening to the edge of the gum. He said he took issue with Dr. Ingersoll, claiming that the deposits are the results of the rheumatic diathesis, and not, as the doctor says, the result of suppuration. He had never seen a case of these concretions in which the patient was not rheumatic. He spoke of one case where cementitis appeared to have been caused by reflex influence from malposition of the uterus. He said that diabetes mellitus and albuminuria will cause so-called pyorrhea alveolaris, but no concretions on the teeth. These concretions were the cause of the inflammation and the result of the gouty or rheumatic diathesis. He had not been able to demonstrate by chemical analysis whether they were made up of uric acid and lime-salts, but the next case in which he had to extract a tooth he would submit it to a chemist and have an analysis made of the deposit. Many cases never go on to the secretion of pus ; most of them result in exostosis. Those which go on to the formation of a pus-pocket are few when compared to those which result merely in thickening of the membrane and exostosis. He had found that putting patients on a treatment of salicylate of soda would benefit the mouth, and it was this fact that called his attention to the origin of the trouble.

Dr. J. Taft read a short paper upon the care of the teeth, and the duty of dentist, physician, and parent to do all in their power to impress those under their care with the necessity of proper hygienic care of the mouth and the teeth. The time to exercise this care was when the teeth were in good condition, not waiting until they were diseased.

Dr. Whitefield thought that dentists should decline to operate for patients until they had placed the mouth and teeth in as good condition as it was possible to get them by the use of the tooth-brush.

Adjourned to meet next year in Detroit, Mich.

CHICAGO DENTAL CLUB.

A REGULAR meeting of the Chicago Dental Club was held May 25, 1891; Dr. A. B. Clark, president, in the chair.

Dr. Eugene S. Talbot read a paper entitled "The Management of Dental Societies."*

Discussion.

Dr. John S. Marshall. The essayist has put the probe into this matter rather deeply, and I am inclined to think that in a great many of the suggestions made he is right. It is just as he has said in regard to a great many papers, they have not been carefully prepared. Some members leave the preparation of their papers until the last minute, and then hurriedly write them. They are not scientific papers, for there is very little science in them. Such papers as consume years of hard study in their preparation, the work being done outside of the duties of a laborious office practice, are generally of greatest value, and will elicit discussion commensurate with their value.

The suggestion with regard to sending copies or abstracts of papers to members before they are read at the meeting, so that they can be intelligently discussed, is an excellent idea, and if practiced it would add materially to the interest of meetings. There are very few men indeed, who, having heard a scientific paper read for the first time, can intelligently discuss it. It requires thought and time to look up authorities, and one cannot intelligently discuss a paper on the spur of the moment unless he is a walking encyclopedia. I am heartily in favor of at least a synopsis of papers being presented to certain members, so that we may have an intelligent discussion upon them.

The essayist brought out an idea that seems to me to be a little visionary, viz: a central place of meeting for our national society, where we could have a large building with a commodious hall, etc. While it would be a nice thing to have a museum and a library, if we had these at one particular point or town, the only ones who would get the benefit from them would be those who lived in that particular locality. Others would probably go once a year, and that would be about all the good that it amounted to.

Dr. C. P. Pruyn. I feel as though I can re-echo the sentiments expressed by Dr. Marshall. There are a few thoughts, however, which he did not mention. One is this : The essayist spoke of a judiciary committee to whom we should intrust the business matters of the society. I think that is a wise suggestion. It was proven so at the twenty-fifth anniversary meeting of the Chicago Dental Society, two years ago. At that time we had one of the best dental meetings known in the world's history. It was a most successful one both scientifically and socially. No business matters were brought before the society ; nothing but scientific work was done. Members were satisfied, and felt that they were well repaid for their time in attending the meeting. The same plan is working very well in the State Dental Society, although it has met with some opposition. Even the greatest opponents of the plan seem to feel that it has resulted in great practical benefit to the society. While some may object to it theoretically, it has proven a boon, I think, to the State Society during the two years under which we have been working with it. We never get into trouble in discussing matters of scientific importance, in methods of operating, etc. ; it is only when we discuss business matters : and this could be obviated just as well as not if a committee were appointed to attend to all such details.

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*See page 746, current number.

Dr. C. E. Bentley. The essayist makes an earnest plea for scientific work. Twenty years ago, or within the recollection of the older members of the society, a scientific paper in a dental society was an unknown thing. The deductions of papers of those days, I have been told, were based upon the purely concrete ; the abstract was not dealt with at all. I was told that ten years ago there were only three graduates in a dental society in this city, and they were young men.

Dr. Talbot makes a plea for scientific papers, and that surely is a plea in the right direction. I believe there are a large number of men in the profession to-day who owe their professional capital to dental societies, largely made up from the discussions which they have heard in attending meetings. Dental societies have shown that it is possible to produce good results from raw material in men who have not had the advantages of previous education.

I think the younger members of the profession are going to make dentistry what it has never been before. There is more good dentistry being done to-day than ever before in its history, and it behooves the dental society to look after its young men, to furnish them the stimulus to work.

I heartily indorse the essayist's recommendation and what has been said about the preparation of papers and putting copies or abstracts of them into the hands of certain members for their perusal prior to their being read.

The essayist referred to Dr. J. W. White's assertion, that there were some matters outside of dentistry yet untouched, particularizing the sciences of biology and evolution. I am in full accord with the sentiment of this statement.

Dr. A. E. Baldwin. I feel especially interested in the plea made by the last speaker in regard to the guardianship of the younger element of the profession by the older. I might go farther than that, and say the younger men should guard the old, for we are all banded together for the accomplishment of the greatest good to our patrons and the public. While complimenting the author in regard to his paper, I must take issue with some of the ideas advanced in the first part of it. I believe that the object he wishes to attain can be accomplished just as readily—and more so—by clinical teaching. In our medical colleges to-day the pendulum of teaching is swinging gradually away from didactic to clinical teaching. And why should it not be so in our dental societies?

I want to place myself on record as antagonizing the thought that because I want to see some men operate, I feel that I am not a properly educated dentist, as I understood the paper to say. A man is expected, when he graduates in college, to know all these things,—to know how to put in an amalgam filling, and how to fill roots, and to meet emergencies,—but I do not think we shall ever see students graduated perfectly qualified in such matters.

In regard to the query given by the essayist, How surprising it would be to see a medical society meeting where such things would be done! Gentlemen, I have been in drug stores, and have seen many prescriptions written by men who had practiced many years, and it was very difficult to know what was meant in the prescriptions. I think if there were demonstrations, clinical and otherwise, in medical and dental societies, in almost every detail it would result in great benefit to the members.

Another statement made in the paper I should object to, and that is classifying the operations that we have to perform every day as being purely of the same character as the making of a wheel by the wheelwright and the engine by the engine-maker. There is no royal road to the operations we perform daily. There are no two cases that come into our office that are exactly alike. The wheelwright has a certain rule for doing a certain thing *always*, so that it is mathematically correct. We cannot do this in our practice. The great trouble with us as dentists is, we are not broad enough. We do not branch out and look broadly at the questions that come before us. We hear of *dental* therapeutics. There is no such thing in the world. Therapeutics is *general*. There is no *dental* anatomy; it is a misnomer. The anatomy of the surgeon, oculist, or general practitioner is the anatomy of the dentist. It is wrong for us to confine ourselves to these narrow meanings. The neuralgia of the fifth pair of nerves is the same neuralgia that occurs in other portions of the body, modified only by surroundings and conditions. There is a tendency in discussing these questions to think there is a law applied to dentistry that does not apply to the body elsewhere.

Another point. If we do business, let us do it in a business-like manner. It is not necessary to go to a parliamentary school to learn to do it. You go into a meeting that is conducted in a parliamentary way, and you will find that they transact business in the shortest possible time, because they hew to the line. A man that does not speak to the subject is called down. If he has anything to say, he says it.

I am in thorough sympathy with any method of transacting society business in the most expeditious way possible, and that way is a parliamentary way. I think that it would be much better for us if we had a more studied effort by all the members to try and work in some special line—some kind of investigation. We cannot all be specialists in putting in gold and amalgam fillings. Let each one of us try by study and investigation to elucidate or clear up some special line of our professional work ; then if copies of papers are presented to parties who are to discuss them a month previous to the time of their being read, we will have intelligent discussions, and go home benefited by what has been done.

Dr. C. Stoddard Smith. I wish to commend the paper and the general spirit of it most heartily. I think it is a subject which should attract more general interest than it does among the profession. The members of the profession give little thought to the management of dental societies ; they go to them as a matter of course, a diversion, as it were, giving them little thought except during the time when they are in attendance. If they studied the subject more, it would be vastly more beneficial, and it is by such papers as this that the attention of the profession is brought to bear upon the subject.

While I commend the paper, I take issue with several points contained in it. One point I wish to criticise is the implication in the paper that the time for clinics in any but strictly local societies has passed. I do not believe there is any gentleman living who will deny that the progress which the profession as a whole has made in the last twenty years is largely owing to the clinics which have been given in connection with dental societies throughout the country. I must say that within my knowledge the clinics have had as much, if not more, interest for the members, and have been fully as instructive and popular, as any other portion of the proceedings—I think more so. Many go to a society once a year, and then mainly to see new things or new methods of operating with which they are not familiar. Clinics, however, I think should be confined to local societies. They should not enter into our national societies, but of district societies they should be made a prominent feature.

I wish to criticise the statement made in the paper regarding dental operations as being similar to those of the wagon-maker and other mechanical workers. Dentistry is not a mechanical thing to be done by rule and rote ; it cannot be made so. We cannot always follow precise rules in our operations. Every operation involves some peculiarity or some special manipulation. That the dental colleges turn out men who are not properly fitted to practice dentistry as it should be practiced, is true ; and it is a fact that a great many men who are turned out from dental colleges would be vastly better if they had some further practical instruction under a good operator. As has been said to-night, there is better dentistry done than there ever has been before in the history of the profession, yet there is a vast amount of mediocre dentistry being done, and the only way to prevent this poor work is to bring men into contact with one another at our societies in such a manner as to educate them upon the points lacking.

The politics of dental societies has been referred to, but it was not touched upon elaborately enough. It certainly has been the foundation of a great deal of harm in our dental societies. It still is so, and if there is any way by which it can be avoided, I am in favor of adopting it. Our societies should not be made political machines to bring certain men to the front to do them honor.

With reference to having papers printed and duplicates sent to members previous to their being read, I do think it would be well to have a certain number of copies printed, particularly for those who will be called upon to open a discussion. Every member who is expected or appointed to do this should have an abstract or copy of a paper in his hands in advance of its being read at the meeting of the society. But to print a considerable number of copies for distribution, I think, would be detrimental to the interests of the society.

Dr. E. A. Royce. There are one or two things about clinics which have not been spoken of, which I think it worth while to mention. If you do away with clinics in the district or state societies, you do away with something that is of great practical benefit to the country practitioner. Again, we have in the State not only those who are graduates of colleges, but those that are passed by the State board. The law we are trying to have enacted will place the matter of examination in the hands of the State board entirely. Unfortunately, the examination of our State board contains but little that is practical, and many that have passed the examination in the past have been found entirely wanting in practical dentistry. Surely that class of practitioners who lack practical experience need an opportunity to see clinics at our state, district, and local societies.

Dr. J. H. Woolley. I desire to express my appreciation of the paper, and to say a word with reference to clinics. Clinics give us an opportunity to see how others perform their operations, and by observing we become broader in our line of work; we are taught many of our failures by seeing others operate.

I like the idea of having copies of papers sent to members who are to open the discussion before they are read at the society, because many of us come to our dental societies without any preparation, and take part in discussions on papers in a haphazard manner. When statements are made which are conflicting, many of the younger men of the profession observe the difference of opinion and hardly know what is right, and they adopt methods which sometimes are the wrong ones.

An important point brought out was that with reference to broadening of the profession, looking outside of our immediate field for knowledge. Many of us realize the necessity of a higher education for the young men before they go to a dental college. I believe it is a recognized fact by our best educators that a young man is better prepared, better equipped to enter any business or profession, if he brings with him the advantages of mental training. There are a few men who are self-educated who are capable of controlling large enterprises and taking hold of the larger affairs of life; but the man who carries on a business successfully is the man who has a trained mind, who has a liberal education. He acquires habits of study and a love for books which lead him into other channels than his one particular line of business. I think a man is better able to grasp dental thoughts and dental science who has the advantage of this early education.

Dr. A. E. Baldwin. There is one thing I intended to speak of before, and that is, we underestimate the value of the scientific research of past years. I was not a dentist twenty-five years ago, but I felt that I wanted to inform myself as much as possible on dentistry of the past as well as the present, and to enable me to do this I secured the *Dental News Letter* and DENTAL COSMOS from the beginning to the present time, and have spent a great deal of time in reading over papers and subjects presented twenty and forty years ago. I was surprised to see how history repeats itself. There was a great deal known then that we do not give the people of that time credit for. Some of the ablest papers I have ever read were written many years ago.

Dr. E. S. Talbot. The gentlemen who have criticised the paper seem to lose sight of the points that I had made in regard to the classification of dental societies. I did not discountenance clinics. I said they were good things, but I do not believe they should be brought into our state and national societies. It is kindergarten work, and should be confined to dental colleges and local societies.

We cannot make the success we wish unless we are systematic in what we do. If we have clinics for our national and state societies, they will take the place of work which is more important in those institutions.

Dr. Smith in his remarks speaks of what has been done heretofore, and I quite agree with him that some of the best operators to-day are men who did not attend dental colleges, who got their information and manipulative ability by attending dental societies. That time has passed. We do not want to spend our time following in the methods of practitioners of thirty years ago.

The time has come when we must write original papers, and not copy those that have been printed years before in dental journals. Within the last two or three years papers have been read in our Western dental societies that have been copied word for word out of the "American System of Dentistry." These papers have been published in two dental journals, and then copied into a new work that has been published. The time has come when dentists should know something of what has been published. It is to be regretted that there are so many in our profession who know but little of our own literature. If we had a library where we could consult books and pamphlets, it would not only help us in preparing our own papers, but due credit could be given to those who have gone before us.

In regard to a museum. Ideas have been stolen bodily from men who have invented appliances for operative dentistry. If we had a museum where properly recorded specimens of these were kept and where they could be seen and examined, even if it were only once a year, it would not be difficult for us to ascertain what had been accomplished years before.

Dr. John S. Marshall exhibited a specimen of sarcoma, and made the following remarks :

The specimen is what is termed a round-celled sarcoma. The history, as near as I could get it, is this : The case was referred to me by Dr. Arthur B. Freeman. The patient had been suffering from neuralgia, or what was thought to be neuralgia, on the right side of the face. He went to an office to have his teeth examined, and he was told that one tooth needed devitalizing. It was devitalized, and not properly cared for, consequently an abscess formed and the tooth (first molar) was extracted. The pain continued on this side, and then he was told the second molar should also be devitalized, and that was done, yet no relief followed, and this tooth was removed. The abscess which had started in connection with the first permanent molar had extended backward into the zygomatic fossa. He then fell into the hands of the late Professor Parkes, who examined the case and told him he had extensive cellulitis of that side of the face. He put him under treatment, evacuated the pus, and the case got well. Soon after this he was troubled with pain in the same side of the face, and consulted a dentist of good standing. On examining the case he said there was suppuration of the antrum, and the antrum was opened, but no pus was found at any point. He was treated for two or three months for this difficulty of the antrum, the part being washed out with antiseptic solutions and with peroxide of hydrogen. Pain, however, was not relieved, and the face began to enlarge on that side. He then went to his old dentist, Dr. Freeman, who brought him to me. In the mean time he had a plate made to fill up the space where the teeth had been lost. When the case came to Dr. Freeman, he noticed an abrasion of the gum in the region of the second permanent molar. The plate was cut away to relieve pressure, but the abrasion did not heal. It began to grow larger, and coarse granulations soon showed themselves in the region of the first permanent molar. He saw the case two or three days after, and the increase in size was quite marked, and he then brought the case to me for examination and counsel. We were of the opinion that it was a malignant growth, in all probability some form of cancer occupying the antrum of Highmore. In order to make the diagnosis sure, I passed an exploring-needle into it, and found a mass of soft tissue, with no fluid or pus. A small portion of the growth was excised, and submitted for microscopical examination to Dr. Frank Cary. I made an examination of it myself, and it was also submitted to Dr. Louis L. McArthur. There were three of us who examined the tissue before deciding what it was, and by common consent it was voted to be a small round-celled sarcoma. I decided to operate on the case at once, thinking from appearances that the disease was confined to the antrum, and with the assistance of Dr. Freeman and the family physician I opened the antrum and removed a mass of sarcomatous tissue and left the antrum comparatively clean so far as we could discover, cutting away, of course, everything that could be reached, even opening into the nasal fossa. I hoped we had gotten to the end of the difficulty, but in less than two weeks' time we noticed that the swelling in the malar region was enlarging quite rapidly. At the end of six weeks from the first operation we decided it would be necessary to operate again, and two weeks later, after consultation with Professor John E. Owen, an operation was made for the removal of the superior (right) maxilla and the malar. Both were extensively involved, as the specimen shows. The operation, in which I was assisted by Professor Owen and the internes of St. Luke's Free Hospital, was the ordinary one for the removal of such bones, viz : an incision was made through the upper lip in the median line, around the right ala of the nose and upward to the inner canthus of the eye, then outward along the lower border of the orbit to the outer canthus of the eye.

The overlying tissue was then dissected from the tumor, the periosteum lifted from the orbital plate of the superior maxilla, and the left central incisor extracted. The zygomatic process of the malar bone was cut through with the Hayes saw, the nasal process of the superior maxilla was severed with the straight bone-cutting forceps, and the palate process divided in the median line with a narrow saw, after which the velum palati of the right side was divided on a line with the posterior edge of the palate bone. The superior maxilla was then seized with the lion-jawed forceps, and the mass wrenched from its attachments. The tumor was so friable that it was torn into several pieces in its removal. Every effort was made by scraping the surface of the wound to remove the last vestige of the growth, but no assurance can be given that this has been done with positive certainty ; time alone will settle this point ; in fact, clinical experience proves that this much to be desired result is rarely attained. We hope, however, for the best.

Sarcomas are connective-tissue tumors. Those of you who have studied morphology know that in the disk of Pander there are formed three layers, one known as the upper layer, the epiblast ; the mesoblast, the middle layer ; and the hypoblast, the under layer. From the epiblast we have formed the skin and all its glandular appendages, —the hair, the nails, etc. From the hypoblast we have formed the mucous membrane and its glandular appendages, including the alimentary canal and the large glandular structures of the abdomen and the teeth. From the mesoblast we have formed the bones of the entire skeleton, the muscles and all the connective tissues, the blood-vessels, and the nervous system.

Sarcomas have their origin in tissue formed from the mesoblast. In sarcomas we always find connective-tissue elements predominating. We rarely ever find epithelial elements in sarcomas. Carcinomas are made up of epithelial elements, the epithelial cells predominating. The sarcomas, of course, are formed by rapid proliferation of connective-tissue cells. There are three varieties of cells found in sarcoma,—the round cell, which is divided into small and large spindle-cells, and the large or multinuclear or amyloid cell.

With regard to the prognosis, those of you who have studied this question know that malignant growths of this kind have not a good prognosis. The majority of these cases terminate fatally. If operated upon early enough, cures are occasionally effected. For instance, in sarcomas and carcinomas as well, if you remove the tumor before it begins to break down and before these peculiar cells are floated away and find lodgment in the lymphatics, the chances of a cure are good.

Of course, there is always danger in these operations of leaving behind some of the cancerous tissue. You can readily understand how in a case of this kind there may be portions of sarcomatous tissue left behind that could not be seen during the operation. So far as we were able to see, we thought we removed all the diseased tissue, but there may be some left behind to serve as a nidus for the recurrence of the growth.

To give an idea of the extent of the incision, let me say it required thirty sutures to close it after the operation had been made, and also that not only were the superior maxilla and the malar removed, but a portion of the nasal bone was cut away and a portion of the sphenoid. The disease was extending backward, and we feared the brain might soon become involved. There was a great deal of hemorrhage, which was controlled, however, without ligatures. We were not obliged to apply a single ligature to arrest hemorrhage ; this was done by sponges wrung out of hot water. The wound was thoroughly packed with Thiersch's gauze and allowed to remain four days,—a little longer than was quite justifiable, perhaps. The patient was weak from the operation, and I allowed the dressing to remain until I saw there was elevation of temperature, then I removed the packing. The temperature on the fourth day went up to 102.4°. On the first day after the operation it was 100°, and when it arose to 102.4°, I made up my mind we had septic material there, and the sooner it was removed the better. The packing was removed at four o'clock in the afternoon, and at eight o'clock at night the temperature fell to normal. Of course, the wound was thoroughly cleansed with Thiersch's solution, and there has been no subsequent elevation of temperature. From that time on the man has done well, and the wound is entirely healed. I saw him the day he left the hospital, and feared that there had been some sarcomatous tissue left behind, and that perhaps he would have further trouble, but I have since seen the case, and feel more hopeful as to the ultimate result.

The case has been interesting to me from the fact that I have never been called upon to do such an extensive operation before. I have removed the superior maxilla and the inferior maxilla, but never had a similar operation of such magnitude as this was. I shall endeavor to keep the society posted as to the final result of the case if I am permitted to watch it through to the end.

E. C. Bentley, D.D.S.,
Secretary Publication Committee.

AMERICAN DENTAL ASSOCIATION.

The thirty-first annual meeting of the American Dental Association was held at the Town Hall, Saratoga Springs, N. Y., commencing Tuesday, August 4, 1891. The executive committee, under the efficient direction of its chairman, Dr. Crouse, had done its work well, both as regards arrangements for the meeting and the providing of a practical program, resulting in a harmonious gathering. The sessions were well attended, and a large number of excellent papers were read. In fact, the number of papers so far exceeded the time that could be given to them, that the reading of several of those offered was unavoidably postponed until next year; and of some of those read there was no discussion for the same reason.

The interference of the purely business matters of the association with the scientific work was one of the subjects considered in President Harlan's able address as well worthy of reform; and in accordance with his suggestion, a committee was appointed to consider ways and means for divorcing the business from the scientific work. This committee at a subsequent session presented a plan for the accomplishment of this end, which was ordered printed and mailed to members, in order that any further suggestions might be forwarded to the committee, so that final action could be had next year.

The meeting was, take it all in all, one of the best and most interesting the association has held. A full report will appear in the DENTAL COSMOS later.

The following officers were elected for the ensuing year: W. W. Walker, New York, president; J. D. Patterson, Kansas City, first vice-president; S. C. G. Watkins, Mont Clair, N. J., second vice-president; Fred A. Levy, Orange, N. J., corresponding secretary; Geo. H. Cushing, Chicago, recording secretary; A. H. Fuller, St. Louis, Mo., treasurer; J. N. Crouse, Chicago, V. H. Jackson, New York, and Geo. W. McElhaney, Columbus, Ga., members of the executive committee.

The next meeting will be held at Niagara Falls, N. Y., commencing Tuesday, August 2, 1892.

SOUTHERN DENTAL ASSOCIATION.

The twenty-third annual meeting of the Southern Dental Association was held at Morehead City, N. C., in the building of the Teachers' Assembly of the State, which had been kindly placed at the disposal of the association. President G. F. S. Wright, of Columbia, S. C., filled the chair with grace and tact.

In point of attendance the meeting was successful, and the papers read were, as a rule, upon timely and well-chosen themes, contributing to the interest and profit of the gathering. One of the most prominent features was the large number of clinics, in which many of the more important operations were demonstrated by experts.

The subject of providing a permanent home for the association was again thoroughly discussed, the general tenor of the remarks being in favor of the project, with incidental pledges of various sums of money to carry out the idea successfully. One of the locations urged, Harrogate, Tenn., near the Cumberland Gap, was selected for the next place of meeting, to allow the members an opportunity of inspecting and deciding upon its desirability and adaptability for the purpose.

The following officers were elected for the ensuing year: Gordon White, Nashville, Tenn., president; E. L. Hunter, Enfield, N. C., first vice-president; J. T. Calvert, Spartanburgh, S. C., second vice-president; W. H. Marshall, Oxford, Miss., third vice-president; D. R. Stubblefield, Nashville, Tenn., corresponding secretary; H. C. Herring, Concord, N. C., recording secretary; Henry E. Beach, Clarksville, Tenn., treasurer; E. B. Marshall, Rome, Ga., and W. H. Richards, Knoxville, Tenn., members of the executive committee.

The last Tuesday in July, 1892, was selected as the time for the next meeting.

A full report of the proceedings will appear in later issues of the DENTAL COSMOS.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE eighth annual meeting of the National Association of Dental Faculties was held at Saratoga Springs, commencing Saturday, August 1, 1891; the president, Dr. L. D. Carpenter, Atlanta, in the chair.

The following colleges were represented at the meeting:

Baltimore College of Dental Surgery.—R. B. Winder.
Boston Dental College.—John A. Follett.
Chicago College of Dental Surgery.—Truman W. Brophy.
Harvard University, Dental Department.—Thomas Fillebrown.
Kansas City Dental College.—J. D. Patterson.
Missouri Dental College.—W. H. Eames.
New York College of Dentistry.—Frank Abbott.
Ohio College of Dental Surgery.—H. A. Smith.
Pennsylvania College of Dental Surgery.—C. N. Peirce.
Philadelphia Dental College.—Henry I. Dorr.
State University of Iowa, Dental Department.—A. O. Hunt.
University of Michigan, Dental Department.—J. Taft.
University of Pennsylvania, Dental Department.—James Truman.

Vanderbilt University, Dental Department.—W. H. Morgan.

Louisville College of Dentistry.—James Lewis Howe.

Indiana Dental College.—Junius E. Cravens.

University Dental College.—George H. Cushing.

Dental Department of National University.—James B. Hodgkin.

Dental Department of Southern Medical College.—L. D. Carpenter.

School of Dentistry of Meharry Medical Department of Central Tennessee College.—G. W. Hubbard.

University of Maryland, Dental Department.—Isaac H. Davis.

Royal College of Dental Surgeons of Ontario.—J. B. Willmott.

American College of Dental Surgery.—T. Clendenen.

Dr. H. B. Noble, of Columbian University Dental Department, was also present, but not as a delegate.

The University of Denver, Dental Department, was reported upon favorably by the Executive Committee, and was elected a member of the association, and its representative, W. F. McDowell, took part in the meeting.

The applications of Western Dental College, Kansas City, and Dental Department Medical College of Tennessee, Knoxville, were reported favorably, and under the rules laid over for one year.

On motion, it was directed that the National Association of Dental Examiners be requested to appoint a committee of five to confer with a similar committee from the National Association of Dental Faculties in regard to matters of mutual interest to the two associations, their conclusions to be reported back to this meeting. The president appointed as the committee on behalf of the Faculties Association, Drs. Peirce, Winder, Eames, Truman, and Morgan.

The committee subsequently reported the following resolutions as having been agreed to by the conference committee, and recommended that they be confirmed, which was accordingly done :

Resolved, That it is recommended to the state boards that when a graduate after examination has been refused a license and his college requests information as to the causes of his failure to pass the examination, the boards shall furnish the faculty with a detailed statement of the subjects and questions on which the applicant has failed.

Resolved, That we discountenance the publication, by the state boards, of the names of colleges whose graduates have failed to pass.

The committee also reported favorably a communication from the National Association of Dental Examiners, which had been referred to them, as follows :

"As the next session of the colleges marks the commencement of the new plan of three years' college instruction, we recommend that this association request the National Association of Dental Faculties to require each school to issue each year an announcement containing a list of the students classified in the three grades of seniors, juniors, and freshmen; that this list also in each instance designate the absentees, and that each school be required in the same announcement to publish a list of the graduates of the preceding sessions."

On motion of Dr. Cushing, the term absentee in the foregoing was construed to mean one who for any reason has not attended a full course.

The president being asked to rule upon the resolution adopted last year requiring dissections, decided that it was mandatory.

The following, offered by Dr. Abbott, was adopted by a unanimous vote:

Resolved, That any college whose regularly appointed representative fails to sign the constitution within one year from the time of its election to membership shall be dropped from the roll of membership of this association.

Dr. Patterson, from the committee on codification of the rules, presented a report, which was amended and adopted, as follows:

ENTRANCE.

Resolved, That a preliminary examination be required for entrance to our dental colleges. Such requirements shall include a good English education. In case of any applicant failing to pass a satisfactory preliminary examination, the other colleges of this association may be informed of the fact. (Saratoga, 1884; Chicago, 1885.)

Resolved, That a candidate for matriculation who presents a diploma from a reputable literary institution, or other satisfactory evidence of literary qualifications, shall be admitted without further examination. (Saratoga, 1884; Chicago, 1885.)

Resolved, That after the session of 1890–91 a diploma from a reputable medical college shall entitle its holder to enter the second course in dental colleges of this association, but he may be excused from attendance upon lectures and examinations upon the following subjects: General anatomy, chemistry, physiology, materia medica, and therapeutics. (Excelsior, 1890.)

ADMISSION TO SENIOR CLASS.

Resolved, That the colleges of this association may receive into the junior or senior classes only such students as hold certificates of having passed a satisfactory examination in the studies of the freshman or of junior years respectively; this certificate to be a pledge to any college to which they may apply that a previous year has been properly spent in the institution. (Chicago, 1885; changed, Saratoga, 1891.)

Resolved, That applicants for admission to advanced standing from foreign countries shall be required to furnish properly attested evidence of study, attendance upon lectures, etc., the same as required of applicants here; and they shall pass the intermediate examinations. (Chicago, 1885; changed, Saratoga, 1891.)

FORM OF INTERMEDIATE CERTIFICATE.

Place..........................Date....................

This certifies that...has been a member of the ....class in the...college during the session of..............

He was examined at the close of the session in the studies required (as follows), and is entitled to enter the..................class.

Attendance.....................

Freshman Year.	*Junior Year.*
a..	*a*..
b..	*b*..
c..	*c*..
d..	*d*..
e..	*e*..

Each student completing a regular course in any college of this association must be furnished with the above certificate, without which he shall not be accepted by any college for admission to the advanced class, except by conference with and consent of the school from whence he came. (Chicago, 1885; changed, Saratoga, 1891.)

Resolved, That the dean of each school shall upon request furnish the executive committee with the exact character of the intermediate examination held in his school, and whether or not the examination is final. (Niagara, 1886; changed, Saratoga, 1891.)

ATTENDANCE.

Resolved, That candidates for admission to the colleges of this association, who are undergraduates in a reputable medical college, may be admitted to the junior class subject to the rules of examination governing admission to that class. (Saratoga, 1891.)

Resolved, That no college shall give credit for a full term to any student who has entered later than twenty days after the beginning of regular lectures. (Chicago, 1885.)

Resolved, That no college of this association shall admit a student after twenty days from beginning of regular term, except those colleges having a term of more than five months, and that they shall have an extension of time in proportion to the length of term. (Niagara, 1886.)

Resolved, That attendance upon three full regular courses of not less than five months each in separate years shall be required before examination for graduation. (Saratoga, 1889.)

GENERAL.

Resolved, That the fees of all dental colleges, as far as possible, be uniform. (Chicago, 1885.)

Resolved, That the members of any faculty belonging to this association may take part in its discussions, but only the delegated representatives shall vote upon a question before the association. (Niagara, 1886.)

Resolved, That dental schools which do not conform to the regulations of this association shall not be recognized by the association. (Niagara, 1886.)

Resolved, That a standing committee on schools be elected, whose duty it shall be to ascertain as far as practicable the workings of all dental schools in this country and Europe, and be required to furnish information to the dean or secretary of any college when desired, and to report in writing at each meeting of this association. (Niagara, 1886.)

Resolved, That we agree to adopt a graded course of instruction and an intermediate examination between each course, which course of instruction and examination shall be conducted as the faculties of the different colleges represented in this association may deem proper. (Saratoga, 1884; changed, Saratoga, 1891.)

Resolved, That no charges against any faculty shall be reported to the association by any committee before both parties interested have been notified, and an opportunity given for a hearing before said committee. (Washington, 1887.)

Resolved, That as a matter of courtesy, when a student leaves one school to go to another, the dean of the second college shall write to the dean of the first college, inquiring whether there may be any objections to the transfer; this to be done whether the student presents a certificate or not. (Louisville, 1888; changed, Saratoga, 1891.)

Resolved, That hereafter a delegate representing a college in this association shall be a member of a teaching faculty, and shall present credentials from the college to which he belongs, legally authorizing him to represent his college before he shall be entitled to vote. (Louisville, 1888.)

Resolved, That it shall be obligatory upon the dental schools belonging to this association to publish the names of all their matriculates and graduates of the preceding session, with the states and countries from which they come, in their regular annual announcement, and that an asterisk (*) accompany the name of each person not in attendance, and the words "not in attendance" be placed as an explanatory foot-note at the bottom of the page. (Saratoga, 1889.)

Resolved, That the degree of Doctor of Dental Surgery shall not be conferred by any college belonging to this association honorarily, except by the consent of this association. (Saratoga, 1889.)

Resolved, That the term anatomy shall be interpreted to include didactic and practical anatomy, and that in the latter at least two parts of the cadaver shall be dissected in some regularly appointed anatomical department. (Excelsior, 1890.)

MEMBERSHIP.

Resolved, That all applications for membership in this association shall be made in writing, and referred to the executive committee. (Niagara, 1886.)

Resolved, That applicants for membership in this association shall be regularly incorporated dental colleges or departments of medical colleges or universities, wherein at least one full course of lectures has been delivered, and that such dental colleges or departments shall have been in existence at least one scholastic year. (Washington, 1887.)

Resolved, That no application for membership in this association be reported to the executive committee, unless received at least sixty days before the regular meeting. (Washington, 1887.)

Resolved, That all applications for membership reported upon favorably by the executive committee shall lie over one year before final action may be taken thereon. (Saratoga, 1889.)

Resolved, That we recommend that students take two full courses in studies of a general character, such as anatomy, physiology, chemistry, general principles of surgery, materia medica, and therapeutics, and three courses in those of a special dental character. (Excelsior, 1890.)

Recommended, That for a full course of lectures the minimum sum of college fees be $100.00. That diploma fees may be omitted, and an examination fee of not less than $25.00 be substituted therefor and made non-returnable; that a matriculation fee of $5.00 be charged annually. Special-course fees to be $10.00 for each branch taken, and $5.00 matriculation fee.

The American College of Dental Surgery, Chicago, was suspended from membership for two years for violation of the rules of the association in accepting students after the prescribed time and giving them credit for a full term.

A resolution dismissing charges against the Philadelphia Dental College was adopted.

The following were offered and laid over for one year under the rules.

By Dr. Hunt:

Resolved, That in case of charges against any college no final action shall be taken until all parties concerned shall have had at least thirty days' notice.

By Dr. Truman:

Resolved, That at all future meetings of the National Association of Dental Faculties the delegates shall consist of members of faculties, and demonstrators will not be received.

By Dr. Fillebrown:

Voted, That after June, 1893, the yearly course of study shall be not less than seven months, two months of which may be attendance upon clinical instruction in the infirmary of the school, now known as intermediate or infirmary courses.

By Dr. Hunt:

Resolved, That after the session of 1892–93, four years in the study of dentistry be required before graduation.

Dr. Dorr offered a resolution that students who have successfully passed their examinations for advanced standing shall have their certificates given or mailed to them within thirty days after such examinations shall have been completed. Adopted.

The following officers were elected for the ensuing year: W. H. Eames, St. Louis, president; J. D. Patterson, Kansas City, vice-president; J. D. Patterson, Kansas City, secretary; H. A. Smith, Cincinnati, treasurer; J. Taft, A. O. Hunt, and Frank Abbott, executive committee.

The president appointed the following standing committees: Ad Interim Committee, James Truman, Frank Abbott, and Thomas Fillebrown; Committee on Schools, D. R. Stubblefield, J. A. Follett, J. Lewis Howe, J. E. Cravens, S. H. Guilford.

Adjourned to meet at the place of the next meeting of the American Dental Association, on the Monday previous, at 10 o'clock.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE National Association of Dental Examiners held its tenth annual session at Saratoga Springs, commencing Monday, August 3, 1891.

In the absence of the regularly elected officers, Dr. L. D. Shepard was elected president, and Dr. Levy secretary-treasurer *pro tem.*

The following state boards of dental examiners were represented:

Vermont.—James Lewis.
New Jersey.—Fred. C. Barlow, Fred A. Levy.
Ohio.—J. Taft, H. A. Smith, L. E. Custer, C. R. Butler.
Pennsylvania.—Louis Jack, W. E. Magill.
Georgia.—George W. McElhaney.
Maryland.—A. J. Volck.
Massachusetts.—L. D. Shepard, J. S. Hurlbut.
Mississippi.—W. H. Marshall.
Iowa.—J. T. Abbott.
Louisiana.—Geo. J. Friedrichs.

The following state boards were admitted to membership:

Tennessee.—J. Y. Crawford.
New Hampshire.—E. B. Davis.
Maine.—E. J. Roberts, D. W. Fellows.

A committee consisting of Drs. Shepard, Fellows, Crawford, McElhaney, and Magill, was appointed to confer with a similar committee from the National Association of Dental Faculties, for the better understanding of questions involving educational interests.

The committee subsequently reported that the conference committees had agreed upon the following resolutions, which were, on motion, confirmed:

Whereas, There can be no question that the main object in view of both the National Association of Dental Faculties and the National Association of Dental Examiners is the better preparation of the young dentists for usefulness in the community, and that to secure this end it is desirable that the state boards of dental examiners and the colleges should work in harmony; therefore

Resolved, That it is recommended to the state boards that when a graduate after examination has been refused a license and his college requests information as to the causes of his failure to pass the examination, the boards shall furnish the faculty with a detailed statement of the subjects and questions on which the applicant has failed.

Resolved, That we discountenance the publication by the state boards of the names of colleges whose graduates have failed to pass.

The committee on colleges reported that they had received reports of the number of matriculates and graduates of twenty-eight colleges, as follows:

NUMBER OF MATRICULATES AND GRADUATES OF THE DENTAL COLLEGES.		Matriculates.	Absentees.	Graduates.	Ratio.
Baltimore College of Dental Surgery	Baltimore, Md.	224	3	76	34.3
Boston Dental College	Boston, Mass.	96		31	32.2
Chicago College of Dental Surgery	Chicago, Ill.	323		94	29.
Harvard University, Dental Department	Boston, Mass.	44		15	34.
Kansas City Dental College	Kansas City, Mo.	110	5	43	40.
Missouri Dental College	St. Louis, Mo.	90		20	28.8
New York College of Dentistry	New York, N. Y.	283	8	85	30.9
Ohio College of Dental Surgery	Cincinnati, Ohio.	208		75	36.
*Pennsylvania College of Dental Surgery	Philadelphia, Pa.	252	17	94	40.
†Philadelphia Dental College	Philadelphia, Pa.	315		146	46.3
University of California, Dental Department	San Francisco, Cal.	63		16	25.4
University of Iowa, Dental Department	Iowa City, Ia.	161		58	36.
University of Michigan, Dental Department	Ann Arbor, Mich.	132	1	29	22.1
University of Pennsylvania, Dental Department	Philadelphia, Pa.	206	3	83	40.8
Vanderbilt University, Dental Department	Nashville, Tenn.	135		43	31.8
Northwestern College of Dental Surgery	Chicago, Ill.	14		3	21.4
Indiana Dental College	Indianapolis, Ind.	96		40	41.6
Dental Department of Southern Medical College	Atlanta, Ga.	103		38	36.8
School of Dentistry of Meharry Medical College, Department of Central Tennessee College	Nashville, Tenn.	5		1	20.
University of Maryland, Dental Department	Baltimore, Md.	163	4	64	39.7
Columbian University, Dental Department	Washington, D. C.	19		2	10.5
Royal College of Dental Surgeons of Ontario	Canada.	67		27	40.
College of Dentistry, Department of Medicine, University of Minnesota	Minneapolis, Minn.	36		7	19.4
American College of Dental Surgery	Chicago, Ill.	167		49	29.
Aggregate		3312		1144	34.5

* 15 female matriculates. † 9 female matriculates.

DENTAL COLLEGES NOT CONNECTED WITH THE NATIONAL ASSOCIATION.		Matriculates.	Absentees.	Graduates.	Ratio.
German-American	Chicago, Ill.	22		11	50.
Western Dental College	Kansas City, Mo.	61	1	9	15.
United States Dental College	Chicago, Ill.	43		11	25.5
College of Dentistry, University of Denver	Denver, Col.	12		5	41.6
Aggregate		139		36	
Whole aggregate		3451		1180	

Four colleges, members of the National Association of Dental Faculties, had failed to report, namely: University Dental College, Chicago; Dental Department, University of Tennessee; Louisville College of Dentistry; and Dental Department of National University, Washington, D. C.

The committee recommended that "as the next session of the colleges marks the commencement of the new plan of three years' college instruction, that this association request the National Association of Dental Faculties to require each school to issue each year an announcement containing a list of the students, classified in the three grades of seniors, juniors, and freshmen; that this list also in each instance designate the absentees, and that each school be required in the same announcement to publish a list of the graduates of the preceding session."

The committee also reported the following list of colleges which they recommend as reputable:

Baltimore College of Dental Surgery, Baltimore, Md.
Boston Dental College, Boston, Mass.
Chicago College of Dental Surgery, Chicago, Ill.
College of Dentistry, Department of Medicine, University of Minnesota, Minneapolis, Minn.
Dental Department, Columbian University, Washington, D. C.
Dental Department of Northwestern University (now the University Dental College), Chicago, Ill.
Dental Department of Southern Medical College, Atlanta, Ga.
Dental Department of University of Tennessee, Nashville, Tenn.
Harvard University, Dental Department, Cambridge, Mass.
Indiana Dental College, Indianapolis, Ind.
Kansas City Dental College, Kansas City, Mo.
Louisville College of Dentistry, Louisville, Ky.
Missouri Dental College, St. Louis, Mo.
New York College of Dentistry, New York City.
Ohio College of Dental Surgery, Cincinnati, Ohio.
Pennsylvania College of Dental Surgery, Philadelphia, Pa.
Philadelphia Dental College, Philadelphia, Pa.
School of Dentistry of Meharry Medical Department of Central Tennessee College, Nashville, Tenn.
University of California, Dental Department, San Francisco, Cal.
*Northwestern College of Dental Surgery, Chicago (defunct).
University of Iowa, Dental Department, Iowa City, Ia.
University of Maryland, Dental Department, Baltimore, Md.
University of Michigan, Dental Department, Ann Arbor, Mich.
University of Pennsylvania, Dental Department, Philadelphia, Pa.
Vanderbilt University, Dental Department, Nashville, Tenn.
Western Dental College, Kansas City, Mo.
Minnesota Hospital College, Dental Department, Minneapolis, Minn. (defunct).
St. Paul Medical College, Dental Department, St. Paul, Minn. (defunct).

The report was adopted, and the committee on schools was enlarged to consist of one member from each state board. Dr. Louis Jack was appointed chairman of the committee, and the president, secretary, and chairman were authorized to complete its membership and to fill vacancies.

The following was adopted :

Resolved, That this association requests the several boards represented in this body not to indorse beneficiary students.

The following officers were elected for the ensuing year : L. D. Shepard, president ; W. E. Magill, vice-president ; Fred A. Levy, secretary-treasurer.

The officers were empowered to select the time and place of the next meeting.

Adjourned.

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* The diplomas of this college are discredited after 1889.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE twenty-third annual meeting of the Pennsylvania State Dental Society convened in business session at Philadelphia, July 14, 1891, when the following officers were elected for the ensuing year: Louis Jack, Philadelphia, president; C. S. Beck, Wilkes-Barre, first vice-president; F. L. Bassett, Philadelphia, second vice-president; C. V. Kratzer, Reading, recording secretary; J. C. Hertz, Easton, assistant recording secretary; J. N. Young, Wilkes-Barre, corresponding secretary; G. W. Klump, Williamsport, treasurer. Executive Committee: F. L. Bassett, D. N. McQuillen, P. K. Filbert, C. S. Beck, W. H. Fundenberg. State Dental Examining Board: W. E. Magill, J. C. Green, W. E. Van Orsdel, Louis Jack, G. W. Klump, J. A. Libbey, C. S. Beck.

C. V. KRATZER, *Corresponding Secretary.*

MASSACHUSETTS DENTAL SOCIETY.

THE annual meeting of the Massachusetts Dental Society was held in Boston, July 9 and 10, 1891.

The following officers were elected: George F. Eames, Boston, president; J. W. Ball and W. E. Page, Boston, vice-presidents; Edgar O. Kinsman, Cambridge, secretary; Edward Page, Charlestown, treasurer; Jos. King Knight, Hyde Park, librarian; R. R. Andrews, Jos. King Knight, W. E. Boardman, H. S. Draper, and V. C. Pond, executive committee.

A committee, consisting of Drs. Waldo E. Boardman, Frederick E. Banfield, and Horatio C. Meriam, submitted resolutions of respect to the memory of Dr. D. Frank Whitten, reciting that the society had "learned with deep regret of the death of one who was an earnest, capable, and conscientious member of our profession and of the society; whose modest demeanor and faithfulness in the discharge of every duty made his character one worthy of our highest esteem." The sympathy of the society was tendered to the family, and the resolutions ordered to be spread upon the records.

Resolutions of respect were also passed in reference to the death of the late Dr. William H. Atkinson, "an honorary member of this society, whose wisdom, learning, and skill called forth our highest appreciation." Condolence was extended to his family for their irreparable loss. The resolutions were submitted by Drs. George F. Eames, R. R. Andrews, and Stephen G. Stevens, committee.

EDGAR O. KINSMAN, *Secretary*, Cambridge, Mass.

UNION DENTAL SOCIETY.

A MEETING of the Union Dental Society will convene in Peoria, Ill., September 8, 1891, the convention to last two days, or until the program is carried out.

The executive committee in full charge of this meeting reports pledges for an excellent list of papers and clinics. Railway facilities are convenient. Let all attend.

E. K. BLAIR, *Secretary*, Waverly, Ill.

NEW HAMPSHIRE DENTAL SOCIETY.

IN accordance with a vote at its last meeting, the New Hampshire Dental Society will hold a special meeting at the Manchester House, Manchester, N. H., September 29, 30, and October 1, 1891.

BURTON C. RUSSELL, *Secretary*, Keene, N. H.

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EDITORIAL.

THE SCIENTIFIC AND THE PRACTICAL.

AN esteemed correspondent, in a letter giving his views upon the true function and ultimate object of dental journalism, expresses his sentiment regarding the relative values of the scientific and practical, as follows: "I despise the word practical, and all the effort that is made to bring everything down to a practical use. My hand is against the practical, the utilitarian idea of turning everything to the mere benefits of practice and the exclusion of everything that has not an immediate practical bearing." "A journal cannot be practical without losing its tone and degenerating; therefore let it be scientific in the highest sense."

Inasmuch as these sentiments may be shared by other readers of the DENTAL COSMOS, and as an apparent contradiction of meaning attaches itself to the sentences quoted, a definition of the terms scientific and practical and an examination of what to us seems to be their proper application becomes pertinent. By science, is understood an orderly arrangement of facts which represents our knowledge of ascertained truth; that which is known. We regard it as pure or applied; the latter is our knowledge of facts or phenomena as accounted for by their causes, and the systematic expression of the relation subsisting between cause and effect in natural phenomena we term natural law. Pure science is the consideration of natural powers, causes, or laws, apart from all applications.

Practical, as defined by Webster, means, among other things, "capable of being turned to use or account; useful, in distinction to ideal or theoretical."

Our correspondent apparently regards the terms scientific and practical as directly opposed to each other and wholly incompatible. The error of this view becomes at once evident upon even a superficial examination, and it is seen that if not interchangeable they are at least interdependent terms. The definition of them which each one makes for himself depends entirely upon the stand-point from which he views them, and this in turn upon his motive in their pursuit or study.

In a broad sense all science is utilitarian, just as all truth is, in its ultimate analysis; and in this regard it is in the highest degree, practical. As Sir William Hamilton says, a utilitarian is "simply one who prefers the useful to the useless; and who does not?"

All study, all work, must necessarily have an object which bears to it a causal relation. The whole order of nature is a protest against the idea of effects without adequate causes, and the utilitarian element in scientific as well as in practical work is an integral quality of both and their most potent factor for development and progress.

Utilitarianism as a motive power in human progress is conditioned by the character of its object; it is high and worthy, or selfish and degrading, accordingly as it chooses for its aim the ultimate good of the race or the personal benefit and aggrandizement of the individual worker. These two classes of workers, both scientific and practical, certainly exist; there is much work done in all departments of science that is unworthy the name of science,—mere guesswork, the statement of which is couched in mystifying language, and produced solely for the purpose of exalting the personality of the writer, rather than for the higher object of conferring educational or other utilitarian benefit upon humanity. It is work done in this spirit which perhaps more than any other element is a bar to higher advancement in any line of thought, and of this, unfortunately, dentistry has its full share. Again, scientific work done with no motive ulterior to the selfish one of personal benefit is productive of a scientific pedantry whose characteristic exponent is the individual of the holier-than-thou order.

The expressions, "culture for its own sake" and "the study of science for the sake of science," are misleading unless they are meant to include a broad, practical, utilitarian and altruistic object which is "scientific in the highest sense." Considered apart from this, they are productive of a selfish and pedantic culture, simply because they are minus the one object which should animate all study and investigation, the ultimate benefit of the race. Viewed from the stand-point thus outlined, scientific investigation and knowledge are intensely practical, and it becomes impossible to divorce the thought of one from that of the other; and by the same line of reasoning all practical work becomes preëminently scientific, for both lines coincide upon the plane of that higher utilitarianism whose object is the development of the race and the promotion of human progress.

AN EXTRA FORM.

WE call attention to the increase in size of the present issue, made necessary by an excessive demand for space, to meet which an extra form of sixteen pages has been added to the reading-matter. By so doing we are enabled to present several valuable communications which would otherwise have been crowded out or delayed.

OBITUARY.

DR. E. O. WILBUR.

DIED, at Thompsonville, Conn., July 24, 1891, of sporadic cholera, Dr. E. O. WILBUR, in the forty-third year of his age.

Dr. Wilbur was born at Eastford, Conn., August 25, 1848. He enlisted in the First Connecticut Heavy Artillery, January 4, 1864, at the age of fifteen, and was probably the youngest enlisted person from the State. Subsequent to the war he learned the machinist's trade, but entered the ranks of dentistry about thirteen years ago.

Dr. Wilbur was a member and regular attendant of the meetings of the Connecticut Valley Dental Society, and was the inventor of several ingenious little dental appliances. He was a Freemason and an active worker in the G. A. R. He leaves a widow, but no children.

DR. FRANK OVERHOLSER.

DIED, at Logansport, Ind., July 28, 1891, of consumption, FRANK OVERHOLSER, D.D.S., in the thirtieth year of his age.

Dr. Overholser was born in Lockport, Ill., July 26, 1862. When he was seven years old his parents moved to Logansport, Ind., where he was educated, and adopted the profession of his father, Dr. D. L. Overholser. He attended the College of Dental Surgery of the University of Michigan at Ann Arbor, and graduated with honors from that institution, class of 1883. He practiced with his father until 1888, when he established his own office. He had acquired a reputation as a superior dentist, and had a lucrative and growing practice.

Seven years ago Dr. Overholser was married to Miss Louella Gorsuch, of Greenville, Ohio. He was a public-spirited and popular man, and his loss is much deplored in the community in which he lived.

DR. JOHN W. BUZZERD.

DIED, at London, Ohio, July 27, 1891, of cerebral affection, JOHN WESLEY BUZZERD, D.D.S., in the thirty-first year of his age.

Dr. Buzzerd was born near London, Ohio, September 15, 1860. He attained a good degree of scholarship in the public schools, and in the fall of 1888 began the study of dentistry with Dr. John S. Chance. After a year's study he entered the Ohio College of Dental Surgery at Cincinnati, from which institution he graduated with honors last spring. He then formed a partnership for practice with Dr. Joseph W. Chance, and gave promise of much success in his line of work. The funeral services were under the auspices of the Odd Fellows, of which fraternity he was an esteemed member. His early death is felt by his family and the community to have cut short a promising career.

DR. J. F. FOWLER.

DIED, at the residence of his nephew, New York City, July 23, 1891, Dr. J. F. FOWLER, in the eightieth year of his age.

Dr. Fowler was a well-known dentist of Newark, N. J., where he had been in practice for a great many years. He was a member of the New Jersey State Dental Society and of the Central Dental Association of Northern New Jersey. Some time since he went to Florida, but soon returned, and died at the advanced age above stated. His wife and four children all died before him.

THE LATE DR. EDWARD MAYNARD.

FOLLOWING is the text of the report of the committee appointed by the First District Dental Society of the State of New York to prepare resolutions on the death of the late Dr. Edward Maynard. At the meeting of June 9, 1891, the report was received and unanimously adopted :

Your committee appointed to report to this society in regard to the death of Dr. Maynard beg leave to say that in the demise of Dr. Edward Maynard our society feels that the profession has lost one of its most distinguished members, a man who was associated with all that was best in our calling, who did much toward elevating it to its present dignity and usefulness, and it desires to place on record not only its appreciation of his eminent services and of our great obligations to him, but of the great loss we and the world at large have met with.

At the commencement of his career, he with his contemporaries labored in a new and comparatively untrodden field, whose history had yet to be made and whose superstructure had not yet been established. He nobly responded to the call that was made upon him, and has left behind him a heritage that will ever be dear to us all.

His death represents the breaking of a link connecting the present with the past, and with his decease, almost the last of his early associates, those sturdy pioneers take their departure. So completely has he been associated with the past that many of our younger members almost look upon him as a tradition, and will scarcely realize his passing away; but upon the outer world, as well as our own, he has made an impression that will endure through all time.

Modest and retiring in his nature, he united the most pronounced decision and firmness of character with all the delicate qualities of womanhood; these, with his poetic and genial nature, gave a charm and grace to his presence which his friends will never forget.

Through his great inventive talent and genius, he was the recipient of the most distinguished honors and recognition throughout the civilized world. It was always a matter of great satisfaction to him that through these he reflectively gave honor and credit to our own, the profession of his choice.

While recognizing the hand of Divine Providence in taking to Himself our dear friend and colaborer, Dr. Edward Maynard, and while realizing our own great loss, we do as a society extend to his surviving family our most sincere expressions of condolence and sympathy.

W. H. DWINELLE,
S. G. PERRY, *Committee.*
J. F. P. HODSON,

PERISCOPE.

CHLORALAMID IN SURGERY.—Professor Emory Lanphear, of the University Medical College, Kansas City, Mo., in *Notes on New Remedies*, recommends the use of chloralamid as a reliable hypnotic to quiet the nervous system and induce sleep after surgical operations. He finds it preferable to morphia, sulfonal, the bromides, chloral, or hyoscyamus, being devoid of the tendency to produce cardiac or digestive disturbances. It exerts its influence upon both brain and spinal cord, producing sleep and reducing the motor excitement. It may be regarded as a pure hypnotic, without anodyne properties, though some late reports would indicate that it has to some degree the power to abolish pain. It gives prompt, reliable results, with absolute freedom from evil after-effects. Chloralamid is a new medicinal agent, prepared by combining two parts of chloral hydrate with one of formamide. It is a colorless, crystalline substance, nearly tasteless, soluble in about twenty parts of water and two of alcohol. It will keep indefinitely in solution without decomposition. The best way of administering it is to dissolve the required amount, usually ten to thirty grains, in about a teaspoonful of whisky or brandy. If in any case it is desired to have the medicine in liquid form, the following combination may be prescribed:

℞—Chloralamid, ʒij;
Spts. frumenti, fl℥i.
Misce bene ut ft. solut. et adde:
Syrupum rubi idæi, fl℥i.

Misce. Sig.—Dose, one tablespoonful, to be repeated in one hour if sleep is not produced.

This makes a decidedly pleasant mixture, of slight acid taste, and fruity aroma and flavor.

HINTS AND QUERIES.

The Hunt Platino-Porcelain Crown.—This tooth-crown, as devised by Dr. P. G. C. Hunt, is constructed as follows: Make a platinum band of about No. 28 gauge to fit the root, being guided by the bite as to the width of the band, preferably made like Fig. 1. If extra strength is desired, fit a floor of platinum on the root-end within the band (Fig. 2); usually the plain band is all that will be required. Take a plain plate tooth and grind it hollow and thin (Fig. 3), to cover the labial aspect of the band. Adjust, articulate, and secure the tooth, band, and floor with hard wax so that they can be removed for investment in asbestos and plaster. In Fig. 4, A is the band, and B the porcelain fitting the band. Pack White's block body (of as near the shade of the porcelain as may be) into the space between the band, floor, and porcelain; build up the body to the desired contour, and biscuit hard in the Parker-Stoddard furnace. Remove the investment from the sides of the porcelain to clearly disclose the outlines, add body to compensate for shrinkage, and glaze in the furnace, with the result seen in Fig. 5, wherein A is the band, B the porcelain face, and C the baked body. Fig. 6 shows the mounted crown.

Fig. 1.

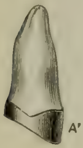


Fig. 2.

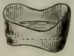


Fig. 3.

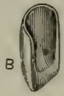


Fig. 4.

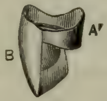


Fig. 5.

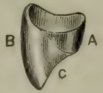


Fig. 6.

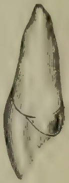


Fig. 7.

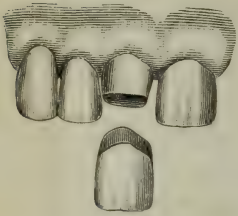


Fig. 8.

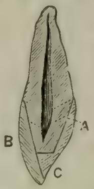


Fig. 9.

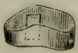


Fig. 10.

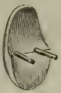
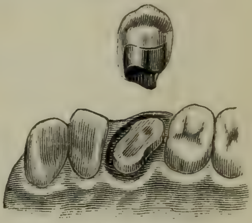


Fig. 11.



When a defective tooth requires a crown which shall not encroach upon the pulp, the sides and face of the natural crown are to be cut away as shown in Fig. 7, taking care to lower the labio-cervical part of the crown so that thickness of the facing and its band shall not cause protrusion of the artificial crown. Fit a platinum band or cap to the stump, and proceed as previously directed. Fig. 8 shows a section of the root, stump, and mounted crown, which is seen ready for mounting in Fig. 7. Sometimes, instead of an entire floor, a transverse brace like that of Fig. 9 connects the sides of the band, or two or three headed platinum pins may be soldered on the inside of the band.

In facing a bicuspid root, the plain cuspid tooth or thin S. S. W. facing may be so ground as to retain the pins (Fig. 10) on which to rest the floor or brace of the band. Fig. 11 represents a case in practice, wherein the obliquity of the bicuspid root end and the breadth of the gap to be filled made a perplexing problem, which was well solved by selecting a broad porcelain cuspid and proceeding as previously described.

In many instances where the difficulties of the case seemed otherwise insurmountable they were readily overcome by this method, and after some experience in its use it will be found to fulfill the requirements of many of the ordinary cases in practice. Any difficulty previously experienced in matching the adjoining teeth for color is obviated by using the ground facing.—George Edwin Hunt, D.D.S., Indianapolis, Ind.

A New Porte-Polisher.—This invention is intended to do away with the inconveniences of the old porte-polishers, which, as many practitioners can testify, were the source of constant and often serious annoyance. Its three clamps hold the point by spring force, thus rendering it perfectly secure in the socket and enabling the point at the same time to be easily and quickly replaced. If, as sometimes happens, the point has shrunk, the simple device of holding a strand of silk across its bottom while being forced into the socket will overcome the difficulty, as shown in Fig. 1.

Fig. 1.

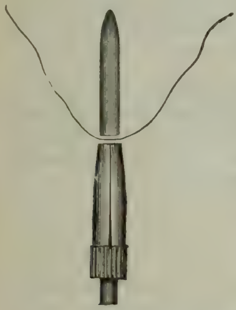
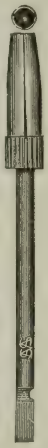


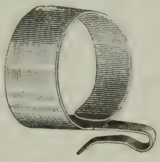
Fig. 2.



While it was devised more especially to carry wooden points, it will also be found a successful porte for hard rubber, corundum, and even the metal-shank brushes. After several months of constant use, I have found it to be superior to anything on the market, saving me time and annoyance. It will be found, too, that its economy in size and shape is a great advantage.

The Porte Sponge.—This little device (Fig. 3) is intended to keep the wheel wet and cool while grinding in the mouth, to save time and the services of an assistant.

Fig. 3.



It is self-adjustable, thus fitting any size of finger. While using in the mouth, it should be upon the index finger, the hook resting on the center of the finger-nail. The index finger being used to hold the cheek free from the teeth, the placing of it on that finger keeps it always in the position required. When used in polishing and grinding bridge-work with the engine, it should be upon the middle finger, the hook, as before, resting upon the finger-nail center, where it will be found extremely convenient, the sponge fitting naturally and easily into contact with the wheel while the thumb and forefinger hold the work in progress.

The sponge, as will be seen from the cut, slips in and out of the hook at will, with perfect ease, requiring only a moment for replacing when it has become worn or foul. It needs only a trial to be thoroughly appreciated.—Gordon White, Nashville, Tenn.

To the Editor of the Dental Cosmos:

Sir,—I wish to indorse Dr. Otto Arnold's method of preventing dark joints, with the exception that I use pink rubber behind the joint instead of white. I can see no special advantage of white over pink, and certainly pink is nearer the color of the porcelain gum. I have used pink rubber in this way for years. If a small portion does get into the joint, I do not know it, for it does not betray its presence.—D. W. Barker, Brooklyn, N. Y.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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PLATE I.

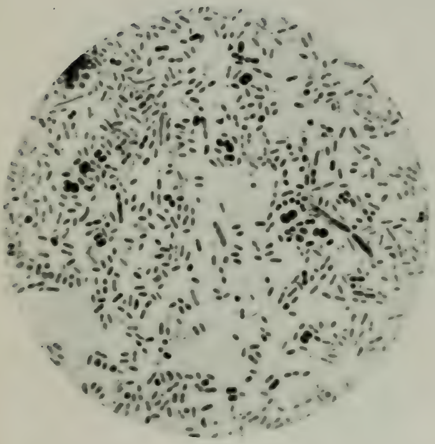
Fig. 1.–Bacteria from a serous peritoneal exudation of a mouse infected with saliva. Methyl violet. 1000:1.

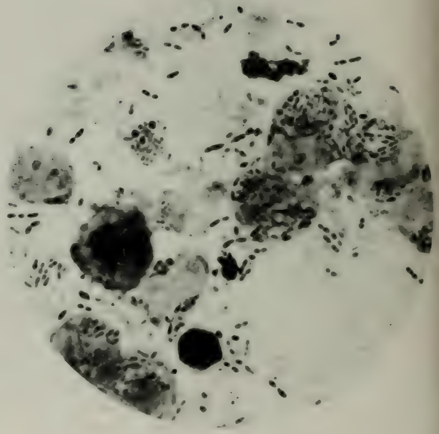
Fig. 2.–Bacteria from a purulent peritoneal exudation of a mouse infected with saliva. Methyl violet. 1000:1.

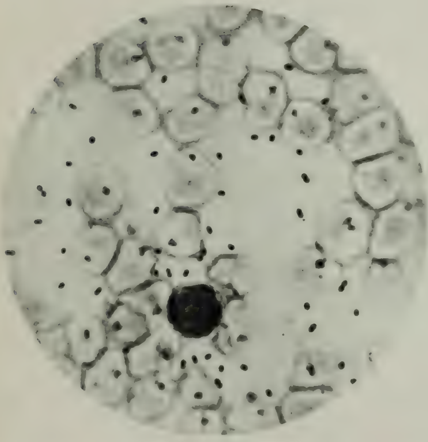
Fig. 3.–Diplococci from the blood of a mouse infected with saliva. Methyl violet. 1000:1.

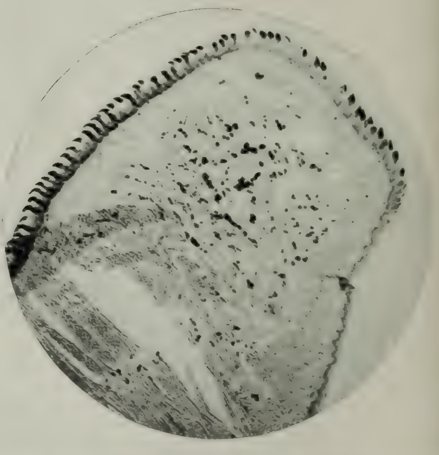
Fig. 4.–Section through tip of tongue of a mouse infected with saliva, showing colonization of the bacteria in the tongue. Methylene blue. 20:1

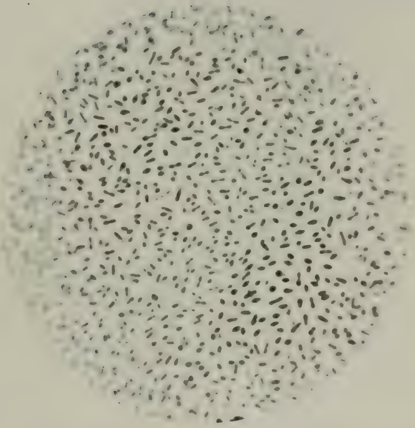

Fig. 5.-Micrococcus of Sputum Septicæmia I. Pure culture from blood of mouse, on blood-serum, one day old. Gentian violet. 1000:1.

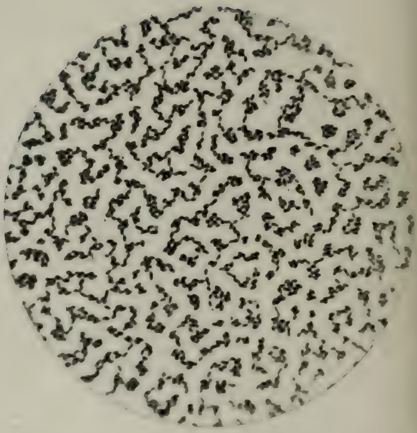

Fig. 6.-Micrococcus of Sputum Septicæmia IV. Pure culture from blood of mouse, on blood-serum, one day old. Gentian violet. 1000:1.

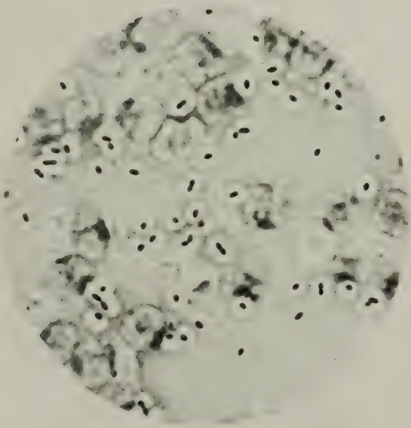

Fig. 7.-Blood of mouse infected with Micrococcus I, showing halo. Gentian violet. 1000:1.

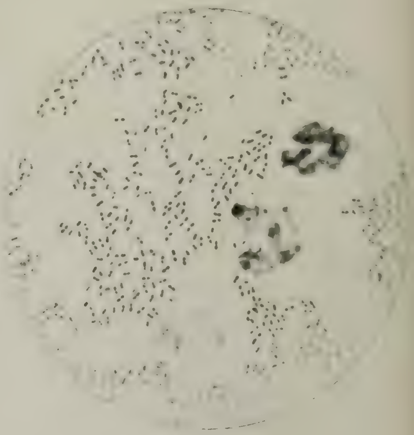

Fig. 8.-Peritoneal liquid from mouse infected with Micrococcus I. Methylene blue. 1000:1.

PLATE IV.

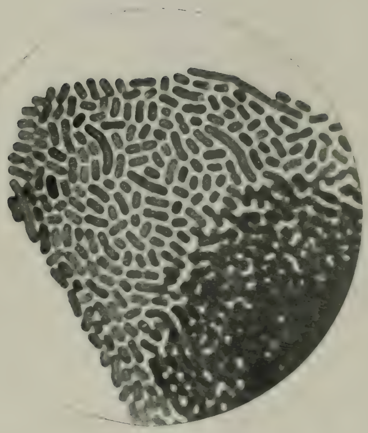

Fig. 13. Bacillus of Sputum Septicæmia. Portion of a colony on gelatine. Impression preparation. Gentian violet. 1000:1.

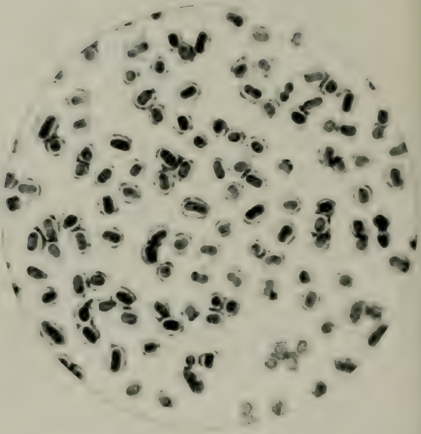

Fig. 14.–Bacillus buccalis muciferens. Pure culture on agar, one day old. Gentian violet, 1000:1.

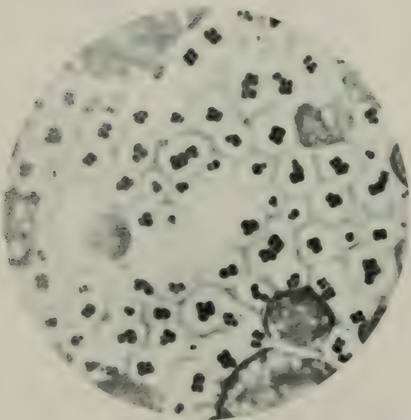

Fig. 15.–Peritoneal slimy, purulent exudation from a mouse infected with saliva, showing a pure culture of M. tetragenus. Methylene blue. 1000:1.

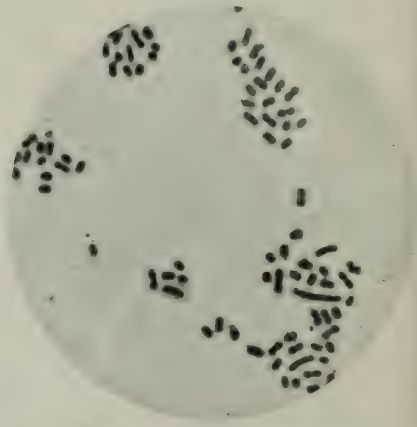

Fig. 16.–Pneumobacillus. Pure culture, showing capsules. Gentian violet. 1000:1.

PLATE IV.

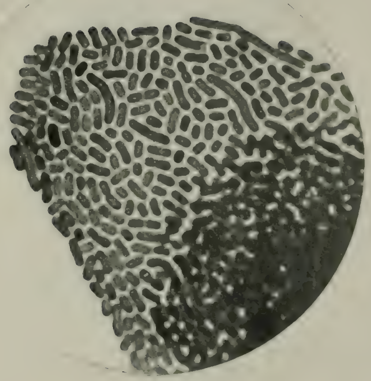

Fig 13. Bacillus of Sputum Septicæmia. Portion of a colony on gelatine. Impression preparation. Gentian violet. 1000:1.

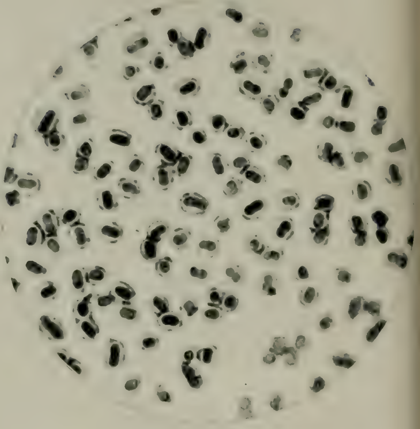

Fig. 14.–Bacillus buccalis muciferens. Pure culture on agar, one day old. Gentian violet, 1000:1.

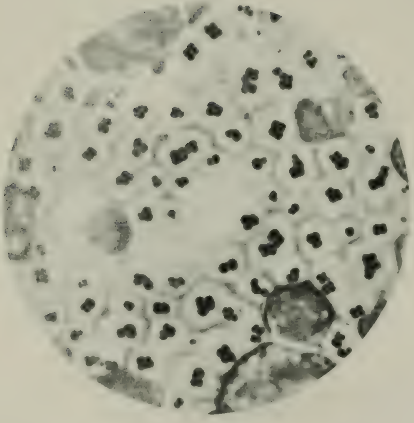

Fig. 15.–Peritoneal slimy, purulent exudation from a mouse infected with saliva, showing a pure culture of M. tetragenus. Methylene blue. 1000:1.

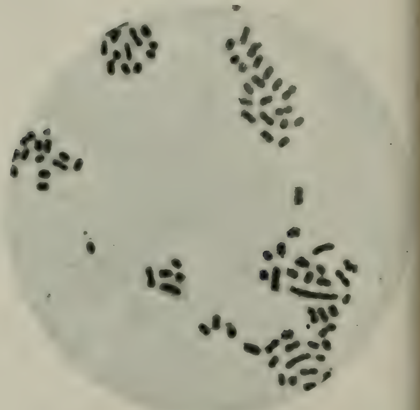

Fig. 16.–Pneumobacillus. Pure culture, showing capsules. Gentian violet. 1000:1

PLATE V.

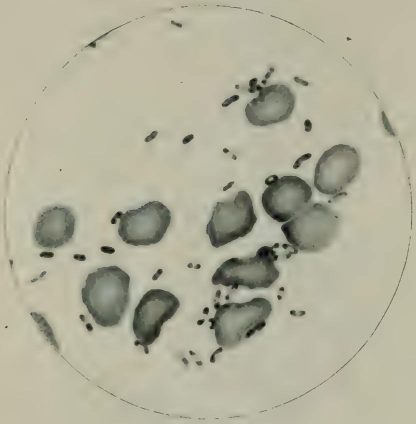

Fig.17.-Bacillus buccalis septicus.
From the blood of a mouse, Methyl violet.
1000:1.

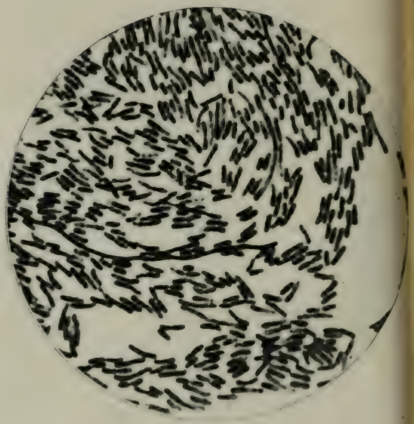

Fig.18.-Bacillus buccalis septicus.
Pure culture on gelatine, one day old.
Methyl violet. 1000:1.

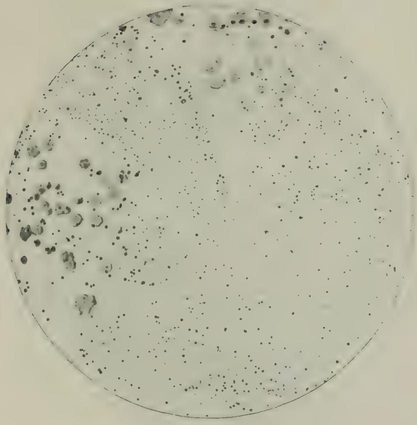

Fig.19.-Bacillus buccalis septicus.
Plate culture on gelatine, three days old.
Nat. size.

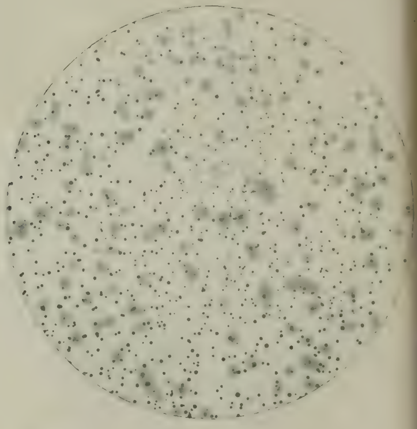

Fig.20.-Bacillus of Sputum Septicæmia.
Plate culture on gelatine, three days old.
Nat. size.

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ORIGINAL COMMUNICATIONS.

THE HUMAN MOUTH AS A FOCUS OF INFECTION.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

(Continued from page 713.)

II. THE PATHOGENIC MOUTH-BACTERIA.

THE investigations of different bacteriologists during the last five years have brought to light a great number of pathogenic micro-organisms, some of which occur in the mouth with considerable frequency, others having been met with but a few times.

Of those whose cultivation on artificial media has been accomplished, the following are the most important:

1. *Micrococcus of Sputum septicæmia*, which will be treated of in full below.
2. *Bacillus crassus sputigenus* (Kreibohm), found twice in the saliva, once in scrapings of the tongue. Pathogenic for mice, rabbits, etc.
3. *Micrococcus tetragenus;* will be described below.
4. *Bacillus salivarius septicus* occurs, according to Biondi, frequently in the saliva of healthy as well as of sick persons; highly pathogenic for mice and rabbits; presents great similarity to the micrococcus of Sputum septicæmia.
5. *Streptococcus septopyæmicus*, found by Biondi in normal saliva. Saliva containing this micro-organism is pathogenic for rabbits, guinea-pigs, and mice, in quantities of 0.5 to 1 c.cm.
6. *Micrococcus gingivæ pyogenes* (Miller), found four times in unclean mouths; possesses pyogenic properties.
7. *Bacterium gingivæ pyogenes* (Miller), found in an unclean mouth and in a suppurating tooth-pulp; possesses pyogenic properties.
8. *Bacillus dentalis viridans* (Miller), found in carious dentine.
9. *Bacillus pulpæ pyogenes* (Miller), found in a gangrenous tooth-pulp.

10. *The pyogenic micrococci.*

11. *Actinomyces* (Ray fungus).

12. *Saccharomyces albicans* (Thrush fungus).

13. *Spirillum sputigenum*, found in the mouths of all human beings. Little is known of its pathogenesis, since no one has succeeded in cultivating it. It appears, however, to possess certain invasive properties, as Verneuil and Clado[*] found it in an abscess of one of the submaxillary ganglia, as well as in a case of adenitis submaxillaris after tooth-extraction and in an abscess following a wound on the finger by the clasp of a plate.

14. *Pane's pneumococcus*,[†] found in saliva of healthy persons as well as in pneumonia. Subcutaneous injections cause inflammation of the lungs in guinea-pigs and rabbits.

15. *Bacillus saprogenes* (Rosenbach), found in the white casts in the recesses of the mucous membrane of the pharyngeal wall.

16. *Streptococcus salivarius pyogenes* (Biondi), found in the abscess of a guinea-pig inoculated with saliva from a case of angina diphtheritica.

17. *Coccus salivarius septicus* (Biondi), found in the saliva of a person suffering from puerperal septicæmia.

18. *Micrococcus Biskra* (Heydenreich), found in saliva of persons suffering from "Pendesch" ulcer.

19. *Bacillus bronchitidis putridæ* (Lumniczer), found in saliva of persons suffering from putrid bronchitis.

20. *Bacillus tussis convulsivæ* (Afanassiew), found in the mucus coughed out during the convulsion.

21. *Bacillus pneumoniæ* (Klein), found in the brown or gray sputum of persons suffering from a disease much akin to croupous pneumonia.

22. *Bacillus pneumo-septicus* (Babes), found in the mucous membrane of the pharynx and larynx of a person dead from septic pneumonia.

23. *Pneumobacillus* (Friedländer).

Besides these, a number of pathogenic bacteria have been met with in the human mouth whose cultivation on artificial media has not succeeded. Finally, various other micro-organisms of great importance as exciters of disease appear to be able to maintain themselves for a considerable length of time in the oral cavity, viz: the micro-organisms of syphilis, tuberculosis, diphtheria, hydrophobia, etc.

For the purpose of determining how often the micrococcus of Sputum septicæmia, now commonly recognized as the cause of croupous pneumonia, occurs in the saliva of persons in good health, I undertook the examination of the saliva of one hundred and eleven such persons (with very few exceptions, students at the Dental Institute of the University of Berlin).

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[*] *Comptes rendus*, 1889, p. 272.

[†] *Rivista clinica et terapeutica*, Agosto, 1886, p. 393.

Method of Examining Saliva for Pathogenic Organisms.

On account of the large number of different micro-organisms commonly found in the human mouth, it is with few exceptions absolutely impossible to arrive at any conclusion regarding the presence or absence of any particular kind by a simple microscopic examination. Cultures on agar-agar also often fail of their purpose, since many pathogenic mouth-bacteria do not grow on this culture-medium, or they grow so slowly that they are soon overgrown and hidden by the more proliferous saprophytes of the mouth. Gelatine is still less adapted to the purpose.

We must, consequently, have resource to the animal body for the purpose of isolating such pathogenic micro-organisms as may be present in the saliva at the time of the examination.

The person whose saliva was to be examined was always instructed to intermix the saliva, by rubbing with the tip of the tongue against the cheeks and gums, with dead epithelium or other films and deposits which are often found clinging to the mucous membrane, and constantly carry enormous numbers of organisms. One to two drops of this saliva were then injected into the abdominal cavity of a white mouse.

Of the one hundred and eleven mice thus operated upon, twenty-seven died within fifteen hours; twenty-two in fifteen to twenty-four hours; eighteen in twenty-four to forty-eight hours; eight in two to four days; nine in four to eight days; thirteen in eight to twenty days; four in twenty to forty days; ten being still healthy after the expiration of thirty days, were put down as having escaped infection. It is quite possible that one or the other of these ten, if kept longer under observation, would still have succumbed to the effects of the inoculation.

In all cases of the first category, the autopsy showed but slight reaction at the point of injection, a varying quantity of a serous or sero-purulent exudation in the peritoneal cavity, and large masses of bacteria among which certain forms appeared almost constantly (Plate I, Figs. 1 and 2). In nearly all of these cases there were forms which, as far as could be determined by the microscopic examination, might be put down as *micrococci of Sputum septicæmia*. In sixteen cases *Micrococcus tetragenus* was present. In three cases a bacillus which will be described later on as *Bacillus buccalis septicus*.

In twelve cases there were large numbers of cocci, staphylococci, and streptococci, the species of which was not determined, and often also a few bacilli of unknown character.

The blood showed in eighteen cases cocci and diplococci (Plate I, Fig. 3), which possessed the characters commonly attributed to micrococcus of Sputum septicæmia; a very minute quantity of the blood sufficed to bring about a fatal septicæmia in mice and rabbits.

In two cases micrococci and diplococci were present, which bore great resemblances to the micrococci of Sputum septicæmia, but were not apparently identical with them.

In five cases the blood contained bacilli; in two, *Micrococcus tetragenus;* in one case a large capsule bacillus, to be described later on as *Bacillus buccalis muciferens.*

In five cases the blood showed two different kinds of micro-organism, and in one case three kinds.

In five cases no bacteria were found in the blood. The death resulted from acute peritonitis, complicated in all cases, except the five just mentioned, with septicæmia.

In those mice which died in fifteen to twenty-four hours, the blood was found to contain micro-organisms with only one exception. The *micrococcus of Sputum septicæmia* was found nineteen times, *Bacillus buccalis muciferens* twice, streptococci once, *Micrococcus tetragenus* twice.

In three cases the infection was mixed.

The appearances presented by the abdominal cavity were not markedly different from those noted in the first category; on the whole, however, the peritonitis was less intense and the variety and numbers of bacteria not so great.

Of the eighteen mice of the third group (twenty-four to forty-eight hours), eleven showed the *micrococcus of Sputum septicæmia* in the blood, two showed the *Megacoccus buccalis muciferens*, one of the *Bacillus buccalis septicus*, and two unknown bacilli which I did not succeed in cultivating. Finally, in two cases the blood was free from micro-organisms.

Five of the eight mice of the fourth group (death in two to four days) showed the *micrococcus of Sputum septicæmia* in the blood. One showed a large bacillus, named bacillus of Sputum septicæmia, described below; one an unknown micro-organism, and in one the blood was free from micro-organisms.

In nearly all cases there was more or less purulent exudation in the peritoneal cavity, and in one case total suppuration.

Of the nine mice of the fourth group (death in four to eight days), three contained the *micrococcus of Sputum septicæmia* in the blood, one of them *Micrococcus tetragenus*, and in five the blood was free from micro-organisms. In these five cases death followed from a total purulent inflammation of the peritoneum, the peritoneal cavity being completely filled with pus.

Of the thirteen mice of the sixth group (death in eight to twenty days) only two contained sputum cocci in the blood: one a few cocci of unknown species, and one a few fine bacilli. In the other nine cases no micro-organisms were found in the blood. In all, with two exceptions, large abscesses or general purulent inflammation with extensive adhesions in the peritoneal cavity; in the pus, masses of cocci and a few bacilli.

The four mice of the seventh group (death in twenty to forty days) all suffered from local suppurative processes; two died from total purulent peritonitis, all the organs of the abdominal cavity being completely imbedded in thick pus with enormous masses of micrococci.

One developed at the point of injection an abscess as large as the end of the finger, which was evacuated on the twenty-first day, after which the animal speedily recovered. The fourth appeared perfectly well till the thirtieth day, when it began gradually to decline. On the fortieth day, when it could scarcely drag itself about the cage and was suffering from profuse diarrhœa, it was killed to put it out of its misery, and at the point of injection a very large abscess was found which had broken into the abdominal cavity.

It will be seen from the above that we may make two grand subdivisions of the pathogenic mouth-bacteria. The first includes those which produce speedy death through blood-poisoning with comparatively slight local reaction; the second, those which induce fatal pyogenic processes at the point of injection.

With very few exceptions, injections with the blood or peritoneal exudations of the deceased mice produced the same results as injections with saliva.

As separate points of interest may be mentioned—

1. An injection with the secretion from a wound produced by extraction caused a total purulent peritonitis and death in thirteen days.

2. An injection of a drop of saliva into the abdominal cavity was followed in one case by an extensive œdema of the cheeks, lips, and tongue, so that the mouse presented the appearance of suffering from an alveolar abscess on both sides of the jaw. Sections through the œdematous tissue showed enormous numbers of micrococci in the tongue in particular, accumulated in masses between the bundles of muscular fibers. Plate I, Fig. 4, shows a section of the tongue under low power.

The pyogenic micro-organisms concerned in these infections from the saliva will be made the subject of further study. At present I have given my attention almost solely to the first subdivisions of the pathogenic micro-organisms above referred to, and the results obtained I shall produce in the following pages.

I consequently dismiss the subject of the pyogenic bacteria of the mouth with the remark, that, according to my present impression, many of them *do not* belong to the familiar groups of staphylococci and streptococci, since they do not grow on gelatine at room-temperature.

In the one hundred and eleven examinations above recorded, capsulated cocci or diplococci, which, according to present usage, would be called *micrococci of Sputum septicæmia*, were found in the blood of the mice fifty-eight times, and apart from these cases three times in the peritoneal exudations, *i.e.*, in all sixty-one times.

Micrococcus tetragenus was found in all twenty-six times.

During the earlier experiments my attention was directed solely to the micrococcus of Sputum septicæmia, and I may have overlooked other organisms, so that in all probability the other species mentioned in reality occur still oftener than indicated by my figures. Accordingly, micrococcus of Sputum septicæmia occurred sixty-one times; Micrococcus tetragenus, twenty-six times; Bacillus buccalis muciferens, four times; bacillus of Sputum septicæmia, three times; bacillus of Sputum septicus, six times; Pneumobacillus, once.

Besides these, various other micro-organisms of pathogenic significance were met with (apart from the pyogenic ones), which I was not able to study more closely. Twice *streptococci* were found in the blood.

The Micrococci of Sputum Septicæmia.

From the time that Pasteur discovered a deadly micro-organism of the form of the figure 8 in the human saliva up to the present, developments regarding the nature and significance of this organism have followed each other in rapid succession. Besides Pasteur, Raynaud and Lannelongue, Vulpian, Moriggia and Marchiafava, Bochefontaine and Arthaud, Sternberg, Claxton, Gaglio and di Mattei, Griffin, Klein, A. Fränkel, myself, and more recently scores of others have furnished contributions to the subject of the toxic properties of the saliva.

A great impulse was given to the study of this subject by the discovery by A. Fränkel that croupous pneumonia is caused by a capsule-bearing micrococcus, identical with or the same as the micro-organism observed by Pasteur and those following him. This observation has been confirmed by Weichselbaum, Foa, Bordoni-Uffreduzzi, Netter, and so many others that at present few doubt the etiological connection of the micrococcus of Sputum septicæmia with croupous pneumonia.

The presence of small cocci or diplococci surrounded by a capsule or halo in microscopic preparations from the sputum is also pretty generally accepted as a means of diagnosing croupous pneumonia in doubtful cases. It is, however, a fact that capsule-cocci have been repeatedly found in connection with a large number of different processes accompanying or independent of pneumonia. Thus almost invariably in the emphysema of pneumonia, in pleuritis, endometritis diphtheritica, peritonitis,[*] pericarditis, and endocarditis,[†] in cerebrospinal meningitis, serositis exudativa,[‡] otitis media,[§] abscesses of the mastoid process, retropharyngeal abscesses, ozæna, rhinitis, coryza, catarrh.[||] Foa and Bordoni-Uffreduzzi even give expression to the possibility that the capsule-coccus may be the cause of the rheumatic diseases.

The coccus has also received various names referring to the connection in which it is found, as Pneumococcus (Fränkel), Ozænacoccus (Löwenberg), Meningococcus (Foa and Bordoni-Uffreduzzi), etc.

In view of these facts, the question has been repeatedly asked, Is it possible for one organism to produce so many and such diversified effects? and the idea suggested that the micrococcus of Sputum septicæmia represents not a single species, but a group of nearly allied species. In such case the lack of harmony found in the descriptions and observations of different authors on the pneumonia coccus would be accounted for also.

In my investigations I have met with four different species of micrococci, all of which answer to the description of the micrococcus of Sputum septicæmia, but show certain differences in form and growth which justify doubts as to their identity.

I call them, for the purpose of description only, micrococcus of Sputum septicæmia I, II, III, and IV.

Micrococcus of Sputum Septicæmia I.

This micro-organism proved to be identical with the Pneumococcus Fränkel, of which Dr. Lehmann, assistant of Professor Fränkel, kindly furnished me a culture from a case of meningitis. Like the other members of this group, it grows best on blood-serum, forming slimy, semi-transparent colonies about the size of the head of a pin, which by transmitted light bear a certain resemblance to minute drops of dew. Where the colonies flow together along the track of the needle, they form a ridge with slightly elevated margins, which attains its maximum growth in one or two days.

On agar-agar it sometimes fails to grow altogether, at others it grows nearly as well as on blood-serum, depending upon some slight difference or other in the constitution or reaction of the medium. It forms on agar in line-cultures very small blue-gray semi-transparent colonies, which, where numerous enough to flow together, form a more grayish opaque growth.

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[*] Weichselbaum, *Wiener Klin. Wochenschr.*, 1888, Nos. 28-32.

[†] Guarnieri.

[‡] Foa and Bordoni-Uffreduzzi. *Archivio per le scienze mediche*, Vol. XI, 1887, No. 19, and *La Riforma medica*, 1887, No. 39.

[§] Moos, *Deutsche Med. Wochenschr.*, 1888, No. 44, p. 902; also Netter.

[||] Thost, *Deutsche Med. Wochenschr.*, 1866, No. 10, and Löwenberg, *ibid.*, p. 446.

Colonies beneath the surface of the agar-agar are gray-brown to yellow-brown, roundish, oval, or pointed, with irregular margin and thick black outline, which, however, is sometimes wanting.

Under a power of two hundred to two hundred and fifty diameters these colonies appear coarse and granular.

Surface colonies under fifty to seventy-five diameters appear round and thin, slightly yellowish-gray toward the middle, colorless at the margin, which is slightly indented or uneven. The surface of the colony frequently presents numerous roundish vacuoles, better seen with a higher power, which give the colony somewhat the appearance of a tissue. A power of two hundred diameters readily shows diplococci, singly or in twos, at the margin of the colony. No growth occurs on gelatine under ordinary conditions.

In the blood and tissues the diplococci are invariably surrounded by a halo (Plate II, Fig. 7); staining in the ordinary methods for capsules usually reveals a capsule.

The diplococci are distinctly elongated, more or less pointed, and often present the appearance of bacilli. They may vary considerably in size in different tissues and in different cultures (Plate II, Figs. 5, 7, 8). On agar the elongated form of the cells is particularly pronounced (Plate II, Fig. 5). Mice injected in the abdominal cavity with the blood or fresh cultures die in about fifteen hours; injected subcutaneously, in about twenty-four hours; vaccinated in a skin pocket at the root of the tail, in thirty-six hours to five days; occasionally they survive the infection. Rabbits and guinea-pigs are likewise susceptible; dogs are immune. The symptoms are too well known to require description. The micro-organisms are found in the blood and all the organs. The lungs often present a dark-red appearance in toto or only in circumscribed portions; at other times they are ash-gray. Occasionally appearances are present indicative of a beginning hepatization, the skin being almost invariably cyanotic.

Micrococcus of Sputum Septicæmia II.

It grows under the same conditions as I, but the growth is usually more extensive. On blood-serum it forms a gray, semi-transparent slimy growth, presenting much more the dew-drop appearance than I. Confluent colonies often form masses 1½–2 mm. in height.

On agar the colonies are seen (under a power of one hundred to two hundred diameters) to be made up of long threads of cocci and diplococci; the vacuoles present in I are wanting.

Characteristics of this species are the formation of capsules on artificial media, blood-serum as well as agar, the constant presence of long chains, and the slimy character of the growths on agar, as well as in the peritoneal exudations of animals infected with this organism. (See Plate III, Figs. 11 and 12.)

The cocci and diplococci in the blood, as well as in the cultures, are usually less pointed than in No. 1; in fact, they sometimes appear quite round.

The hyperæmia of the lungs and the cyanosis are wanting.

Micrococcus of Sputum Septicæmia III

presents many points of similarity with I, but sufficient difference to entitle it, in my judgment, to be considered as a separate, though nearly allied, species.

On agar its colonies present an entirely different appearance from those of I, the vacuoles are wanting, and the surface appears as if made up of innumerable small hexagons, producing a certain resemblance to pleurosigma.

The cells both in the blood and tissues of animals, as well as on artificial media, are more plump and rounded than those of I (Plate III, Figs. 9 and 10). There are also slight macroscopic differences in the growths of I and II. In other points they do not present differences requiring particular mention.

Micrococcus of Sputum Septicæmia IV.

A photo-micrograph of this species is given on Plate II, Fig. 6. It will be seen that it is long and pointed, but much smaller than I. This difference alone would of course not justify the conclusion that it is not the same as I. My reasons for looking upon this organism as a distinct species are to be found in its action upon mice.

I have met with it but once during my investigations. The mice vaccinated with the saliva containing it died inside of twenty-four hours, likewise mice vaccinated with the blood of these inside of thirty hours. The next generation of mice did not succumb till after five days, then followed nine days, while all subsequent vaccinations turned out negatively. In other words, the virulence of the microorganism rapidly decreased on passing it through the body of mice. In this respect micrococcus of Sputum septicæmia IV differs so decidedly from the other micro-organisms of the group as to justify making an independent species of it.

I think there is no doubt about I, II, and IV constituting separate species, but as to whether the differences noted between III and I are sufficiently marked and constant to entitle the former to an independent position opinions will probably differ.

The different species above described present so many points of similarity, and withal are so subject to slight variations in form and growth, that the question of differentiating between them becomes exceedingly difficult.

I am unable to say whether the forms II, III, and IV have any connection with croupous pneumonia and its sequels. Banti (*Arch. di anata. norm. e patol.*, 1890, Vol. V. Abstract in *Centralblatt f. klin. med.*, 1891, No. 18) describes four species of nearly allied micrococci, all of which are capable of exciting pneumonia. Banti has named them Diplococcus pneumonia I, II, III, IV. Foa (*Deutsche Med. Wochenshrift*, 1889, No. 2) also inclines to the view that there are at least two species of pneumococci.

The Loss of Virulence of the Sputum Cocci.

Most observers agree that the micrococci of Sputum septicæmia speedily lose their virulence when cultivated on artificial media. Ten days, seven days, even five days are named as the maximum time for which the cocci remain virulent when cultivated on agar-agar, blood-serum, etc.

The results which I have obtained do not quite accord with the above. A culture of the micrococcus of Sputum septicæmia II, from the blood of a mouse, on blood-serum, dated May 6, which was kept for seven days at a temperature of 35° C., subsequently at room-temperature, was used for inoculating a mouse in the abdominal cavity on the 7th of June. The mouse died inside of twenty hours, showing a pure culture of the cocci in the blood. A culture of micrococcus II, twenty-nine days old, caused death in sixty-five hours; a culture forty days old failed to produce any effect.

The cocci were found exceedingly resistive to the action of low temperatures. A mouse, dead of an infection with micrococcus of Sputum septicæmia II, was hung up outside of the window for twenty-one days between the 22d of December and 13th of January, the temperature ranging during nearly the whole time between 5° and 15° C. below zero. At the end of this time the mouse was thawed out, and an infection made with the blood resulted in the death of the infected animal inside of twenty-four hours.

Experiments relating to the Question of Immunity.

It has been well established that immunity may be conferred upon animals by infecting them with material which has been so far weakened in its virulence that the animal sickens but recovers. A subsequent infection, even with a fully virulent culture, is then harmless.

I have attempted to produce immunity—

1. 0.5 c.cm. of dog-blood direct from the artery was injected into the abdominal cavity of mice. Dogs being immune from sputum septicæmia, it was hoped thereby to confer immunity upon the mice. All experiments with dogs' blood, however, turned out negatively. The blood of a large American rabbit, which had been infected without showing any reaction, conferred a partial immunity upon mice, they dying not until the fifth to seventh day after infection, while the control mice died within twenty-four hours.

2. Mice were fed for several days on large quantities of saccharine, with a view to so saturating them with this material that they would not furnish a suitable culture-medium for the cocci. Results were here also only negative.

3. A large number of antiseptic solutions were made use of, injecting the mice before or after, or both before and after the infection, in the abdominal cavity or subcutaneously, with varying results; sometimes the death of the animal being hastened, sometimes slightly retarded. The only substance with which I obtained positive results was a one per cent. solution of trichloride of iodine. If we inject a mouse subcutaneously with two drops of the water of condensation from a fresh agar or blood-serum culture, or with a slight quantity of diluted infectious blood, and follow up the injection through the same canule with 0.3 c.cm. of a one per cent. solution of trichloride of iodine, the maximal dose for a full-grown mouse, the animal will in most cases survive the infection, though it will lose a piece of skin as large as a finger-nail.

Micrococcus Tetragenus.

This organism was found twenty-six times in one hundred and eleven cases, referred to above, thus proving to be one of the most common pathogenic micro-organisms of the human mouth. My impression is that it occurs still more frequently than indicated in the above numbers, for I may easily have overlooked it in the first fifty cases, where I was watching for sputum cocci only. In the last seventeen cases I found it seven times. In one case only did the death of the mouse result from infection with the Micrococcus tetragenus alone, on the sixth day after the infection. The coccus was found in but limited numbers in the blood. The peritoneal cavity contained a large quantity of a slimy or pasty exudation, with numerous Micrococcus tetragenus and pus cells (Plate IV, Fig. 15).

An infection with the saliva of the same person four months later produced identically the same results.

A rabbit infected with 0.5 c.cm. of a pure culture in bouillon died in three days, and showed a most pronounced general infection. The blood contained but a moderate number of organisms, which were also present in all the organs and in the bone-marrow. The peritoneal cavity contained about 20.0 c.cm. of a purulent mucous exudation, while the intestines were glued together in one mass by a dense fibrinous exudation, in some places 2 to 4 mm. thick ; also fibrinous deposits in the liver and kidneys, spleen greatly enlarged and soft. Pleuritis with slight serous exudation containing Micrococcus tetragenus in the pleural cavity.

Guinea-pigs are likewise susceptible.

The micro-organism grows well on all the common nutritive media, and its characteristics of growth are sufficiently well known to be omitted here.

Micrococcus tetragenus has been found a number of times in suppurative processes resulting from diseased teeth. R. Park* found it along with staphylococci in the pus from the phlegmon of an abscessed tooth, Vangel† in the secretion of a tuberculous ulcer of the nose, Steinhaus‡ in pure culture in an abscess at the angle of the jaw.

Bacillus Buccalis Muciferens.

I have given this name to a micro-organism which I found four times in the blood in form of thick, short rods, surrounded by a capsule or halo, while on artificial media the predominating form is the coccus (Plate IV, Fig. 14). It grows well on the ordinary nutritive media, on agar-agar exceedingly rapidly, forming a semi-transparent, slimy paste very much like starch. Ridges 6–8 mm. wide and 1–2 mm. high may be formed in twenty-four hours.

In dilution-cultures in gelatine it appears in forty hours as dark-gray colonies, almost or quite round, distinctly granular, as if made up of an infinite number of little spheres or mosaics. Each colony also shows a number of bright shining spots on the surface. On potato it appears in twenty-four hours as a grayish-white, moist growth, with indented border. In three to four days the growth takes on a yellowish color, appears semi-transparent, while retaining its moist surface. In cultures on agar-agar in particular, the separate cells are surrounded by thick capsules or sheaths, which give to the cultures their slimy nature. The slime dissolves very slowly in most of the ordinary solvents. Weak solutions of alkalies and acids, also solutions of peroxide of hydrogen, slowly disintegrate the mass without apparently dissolving it. Glycerin in one case cleared it up, in another case not (the culture in the former case was twenty-four hours old ; in the latter, four days). It is precipitated or coagulated by alcohol and five per cent. solutions of bichloride of mercury, slowly dissolved by one per cent. solution of caustic potash ; two per cent. leaves a flaky precipitate. The insolubility of the sheaths renders the devitalization of the cocci by ordinary means very difficult.

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* *Medical News*, 1888, October.

† *Pester Med.-Chirurg. Presse*, No. 36, 1888.

‡ *Zeitschr. f. Hygiene*, Bd. V, 1889, p. 518.

Mice infected with the organisms in the abdominal cavity die in fifteen to thirty hours, with varying numbers of bacilli or cocci in the blood and all the organs. In the peritoneal cavity slimy exudations mixed with pus-corpuscles and vast numbers of bacilli, spleen much enlarged, jelly-like exudation as large as a quarter of a dollar at the point of injection. Subcutaneous injections cause death in one to three days.

Guinea-pigs are likewise susceptible ; rabbits not sufficiently tested.

Bacillus of Sputum Septicæmia

was found in the blood three times. It bears a close resemblance to the foregoing species, though it is undoubtedly distinct. In the blood, as well as in cultures on artificial media, it occurs in form of thick bacilli, occasionally growing out into threads (Plate IV, Fig. 13). In the former situation, as well as on agar-agar or blood-serum, it is provided with a sheath which readily takes on staining matters. It grows exceedingly well on the ordinary media. On agar-agar it forms a paste similar to Bacillus buccalis muciferens, which is, however, distinctly less viscid ; it grows also somewhat more rapidly, and has a milkish gray-white color by transmitted light, in contradistinction to the bluish color of Bacillus buccalis muciferens.

Cultures in bouillon develop rapidly, and on shaking send up a shower of minute bubbles, which continue to ascend for one-half to one minute and form a foam on the surface. In this respect it again differs from the foregoing species.

On gelatine the colonies appear in forty hours as very dark, perfectly round, dense, granular bodies with sharp outline, under high power appearing like mosaic-work. Surface colonies form irregular, semi-transparent drops of the consistence of paste (Plate V, Fig. 20). On potato in twenty-four hours extensive growth, cream-colored and moist in the middle, drier and strongly indented toward the border, and in color scarcely to be distinguished from the potato. In forty-eight hours beautiful growth, margins indented and raised ; after three to four days, opaque, shining, dirty growth. The paste formed by growths on agar-agar dissolves slowly on three per cent. peroxide of hydrogen, less slowly in weak alkalies. The cells possess no motion. Spores not observed ; multiplication only by fissation. Stain readily, but lose color after treatment by Gram's method.

The bacillus of Sputum septicæmia is pathogenic for mice, guinea-pigs, and rabbits (other animals not tested) ; symptoms similar to those produced by Megacoccus buccalis muciferens. The micro-organisms are found in large numbers in the blood and organs, extensive fibrous exudations and œdema at point of injection, tumor of spleen, etc. This organism apparently possesses many points of similarity with Bacillus crassus sputigenus. I was not able, however, to obtain a culture of the latter, and consequently could not determine the relationship of the two.

Pneumobacillus,

more commonly known as Micrococcus pneumoniæ (Friedländer), need not be described at length, since it may be found in different works on bacteriology, which must be in the hands of most dentists and physicians. It is intensely pathogenic for mice; rabbits are immune.

It will be seen by comparing Fig. 16, Plate IV, with Figs. 5 and 7, Plate II, that there is a certain resemblance in shape between the cells of the pneumobacillus and the pneumococcus; it is to me, however, inexplicable how anyone could for that reason pronounce the two species identical, while the one (pneumobacillus) grows so readily on gelatine, the other not at all.

Bacillus Buccalis Septicus.

In six cases out of the one hundred and eleven the presence of this micro-organism was established by inoculation as well as by pure culture. In other cases a bacillus was found which in shape and color reaction appeared identical with Bacillus buccalis septicus, though its identity was not really established by the appropriate tests.

Besides this, the organism in question was found in the pus of an abscess resulting from a wound by a dental instrument. This case, which may be designated as

Chronic Pyæmia caused by the Wound of a Dental Instrument,

presents so many points of interest, and in particular carries with it so severe an admonition, that it will be given in detail.

A young dentist, having accomplished his studies in America, had established himself in a German city and was securing an excellent practice. At this time he had the misfortune to wound the ball of his thumb with a bur with which he was boring out the pulp-chamber of a diseased tooth. The wound was followed by local swelling and suppuration, as well as by swelling of the axillary glands. As it refused to heal, an exploration was made two weeks after the accident, revealing the head of the bur, which had been broken off and remained lodged in the wound. The symptoms disappeared for a time, to reappear in about six to eight weeks in form of an abscess of the lungs and purulent pleuritis. Six weeks of rest and Swiss air brought relief for a time only, the disease reappearing after a lapse of two months in the form of an abscess of the calf of the leg. This was followed during the next two years by no less than one hundred and thirty-five abscesses on every part of the body except the face. The great majority of them were deep-seated phlegmons which were opened in chloroform narcosis. The general health of the patient varied greatly at different times ; sometimes he would feel comparatively well for four or five weeks, at other times he would suffer so severely that his life was repeatedly despaired of. At the time the one hundred and thirty-second abscess had formed, and when all hope had nearly disappeared, it was suggested to try the action of tuberculine (the Koch remedy for consumption). An injection of the ordinary dose was followed by intense reaction, severe headache, high fever, intense nausea, which, as the patient explained, was not confined to the stomach, but seemed to extend over the whole body ; the very flesh seemed to be nauseated. These symptoms gradually disappeared in the course of twenty-four hours, leaving, however, a sore, painful spot on the left arm at which an abscess formed. A second injection was followed by exactly the same reaction a little less intense, and the formation of a second abscess. This complexity of symptoms repeated itself five times, each time growing gradually weaker, the last abscess also being comparatively trifling. The general health also improved greatly, so that good hopes were entertained of a permanent cure. These hopes were, however, destined to be sadly disappointed. The abscesses returned again with their former intensity, so that often the only longing of the patient is that death may put an end to his tortures.

In the pus from one of the abscesses I found the Bacillus buccalis septicus, which I subsequently repeatedly met with, as above stated, in the saliva of healthy persons. The organism occurs in form of rods, often slightly pointed at the extremities, sometimes growing out into long threads (Plate V, Fig. 18). It has no forward or backward motion, but a rotatory movement about an axis vertical to its length. It grows well on ordinary culture-media, even at room-temperature, better still at 30°–37° C.

On gelatine it forms in two days round or nearly round colonies, with not quite sharp margins, homogeneous or very slightly granular, gray or faintly yellowish-gray. Surface colonies are very thin (Plate V, Fig. 19), bluish, traversed by numerous cracks or fissures, margins indented. In line-cultures it grows rapidly, forming beautiful, indented, velvety, grayish-white ridges. On agar-agar the colonies develop rapidly, attaining a diameter of 1–2 mm. in twenty-four hours. On potato, moderate development in twenty-four hours. center moist, gray, border dry, indented, visible only on close observation. In forty-eight hours the growth is distinctly visible, borders raised and clearly defined. In seventy-two hours moist, thick growth, viscid, dirty yellow, with a tinge of pink. On blood-serum it forms ridges 1–1½ mm. wide and ½ mm. high, of slightly yellowish-white color. Young cells stain readily, all old ones with great difficulty. Often certain zones or points of the rods remain unstained, as seen in Fig. 17, Plate V.

Three rabbits were injected with 0.5 c.cm. of a pure culture in bouillon, one in the abdominal cavity, one intravenous, and one subcutaneously. The first was dead in fifteen hours, the second in thirty-five hours, the third in forty-five hours, with symptoms of acute septicæmia ; large numbers of bacilli in the blood (see Fig. 17, plate V) and in the organs, spleen tumor, etc.

White mice and guinea-pigs were likewise susceptible. Cultures on artificial media soon lost their virulence.

(To be continued.)

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 743.)

METHODS OF KEEPING CAVITIES DRY.

DURING the insertion of any kind of filling-material, all cavities should be kept dry unless this is absolutely impossible, which rarely occurs. It does not follow from this axiom that the rubber-dam is invariably necessary. There are very many occasions when a dexterous operator can dispense with the dam, which is always annoying to the patient, and yet insert as good a filling. As a conspicuous illustration of this, I need but to cite cavities occurring in the anterior sulci of superior sixth-year molars. Where the patient is a child, and the cavity small, it is unwarrantable to force a clamp over a short tooth-crown, crowding painfully against sensitive gum-tissue, with the risk of a slip during the operation. This would necessitate the removal of the half-finished filling, and beginning it anew, with the gum bleeding, thus adding to the difficulties of an operation which could have been performed with little trouble by using a napkin. Another condition where the dam is sometimes contraindicated is where the cavity in an approximal surface extends below the gum line. In order to expose the gingival margin, various methods have been advised, to which I need not allude at this time. Where the depredation has been quite extensive, we not infrequently meet a condition where the gum about the edge of the cavity is soft, yielding readily under pressure, but is firm and unyielding around the rest of the circumfer-

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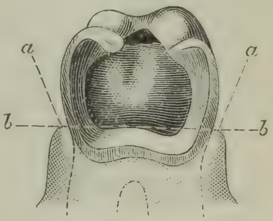
ence at the neck of the tooth. This is especially true of molars. In these cases, though we may succeed in forcing the gum away from the gingival border of the cavity, we have a condition similar to that shown in Fig. 48. Here it is noticeable that while the cavity border is exposed throughout, the pedicles of gum have not yielded at the buccal and labial angles, but retain a normal position. The gum being firmly attached at other points, it is evident that if the rubber-dam be stretched over such a tooth, it will in consequence of the pedicles *a*, *a* span across, and occupy the line *b*, *b*, so that the cavity border will be below the dam. In many cases it is not only impossible to force the dam down with a ligature and keep it there, but the effort to do so, by causing hemorrhage, compels the abandonment of the operation at that sitting. Even where one succeeds in pressing the rubber and ligature below the border, it rises again when tied, because becoming taut it must assume the straight line *b*, *b*; if it is not made taut, leakage will occur. To overcome this difficulty, it has been suggested to use copper wire as a ligature. In a few mild cases this works very well. The wire ligature is applied about the neck of the tooth, and the ends twisted till tight. As with the silk or flax, it follows the line *b*, *b*, but with a suitable instrument it may now be forced below the border of the cavity, carrying the dam with it, and, being metallic, it will retain its position.

FIG. 48.



Where this cannot be accomplished, it becomes impossible to fill the entire cavity with gold. Two courses are open,—either amalgam alone must be depended upon, or amalgam may be used up to, and slightly above the line *b*, *b*, the rest of the cavity being filled with gold at a subsequent sitting. In either case a margin more nearly perfect will be obtained if the napkin is used instead of the rubber-dam, the gum being occasionally mopped with bibulous paper or spunk during the operation. This will be more specially alluded to in discussing the manipulation of amalgams.

When it has been decided to employ the dam, it is requisite that it should be so placed that the patient may suffer least, and the operator have the greatest facility for obtaining access to all parts of the cavity. The first desideratum is that a sufficient number of teeth should be embraced so that all folds of the rubber shall be well out of the way. There should be at least two teeth on each side of the space between the teeth which are to be filled. This as a general rule will answer in most cases. It sometimes happens, however, that much will be gained by embracing five, six, seven, or even more teeth. Cavities in the posterior surfaces of bicuspids and molars are usually trying cases, wherein accessibility and good light are essentials best obtained by stretching the rubber over several teeth. It is usually sufficient to include the central on the side of the mouth where the operation is to be performed.

All attempts thus far to produce a rubber of light color result in destroying its elasticity to such an extent that the material becomes unfit for dental purposes. Thus we are compelled to use a dark-colored dam, which has a decided disadvantage in that it does not reflect light. It therefore becomes important to economize the light as much as possible, by not having any unnecessary creases or folds. As the jaws are curved, it is plain that holes punched in the dam in a straight row, and by guess as to distance apart, will not permit the dam to be stretched over the teeth and lie smoothly. To obtain the proper positions for the holes lay the dam over the teeth, stretching it so that the incisive ends show through ; then make a mark with an excavator, which by slightly scratching produces a whitish dash over each tooth. Punch the holes with a sharp instrument that will cut clean round holes. By this method the dam may be made to adapt itself without a wrinkle. The holes should be graded in size so that they will tightly grasp the tooth-neck, but they should not be made so small that a tear may occur at the slightest touch, or while passing over a tooth. Great care should be used to have the distances between the holes exactly right. If too narrow, they stretch to span the gap, leaving a bit of gum uncovered near the neck of one of the teeth. If too wide, especially at the space where the operation is to occur, trouble may be found in forcing the excess between teeth in close contact, or annoyance will occur from the fold produced by it. Where teeth are close together, a piece of waxed floss should be passed between all of them before any attempt is made to apply the dam. If the floss will not pass, neither will the dam. There may be a rough filling, a fracture of the enamel, a ragged edge of a cavity, or a bit of tartar, either of which will tear the dam. A safe-sided saw should be passed between these teeth, and the obstruction removed. Occasionally there is adequate space near the neck, but, for example, two incisors are in such close contact at their corners that neither ligature nor rubber can be passed between them. In such cases, drive a wedge of wood at the neck till the teeth slightly separate, when the dam may be placed with facility ; then remove the wedge. It is frequently serviceable to soap the dam about the holes.

It very rarely happens that the dam can be forced between the teeth with a ligature, save perhaps in the bicuspid region, where the slanting sides of the cusps favor the method. The too frequent result is, that the ligature cuts the dam, so that while it passes into the space the operator has to contend against a disagreeable leak afterward.

Where such an accident does occur, it is far better at the outset to remove the dam and apply a new piece.

When the cavity to be filled is at the labial festoon, especially where there has been a recession of gum-tissue, and caries has encroached upon the root, it is necessary to make wider spaces than ordinary between the hole in the dam which is to encircle the particular tooth and those on either side of it. If this precaution is not taken, when the clamp is used, and the dam forced up above the cavity edge, the rubber on each side will have stretched so that the gum between the teeth will not be covered, and an annoying leak will ensue. A little practice easily teaches one how to regulate the spacing in these cases. In connection with festoon cavities, the gum may be forced back and away from the edge of the cavity in either of two ways. If it can be placed so that it will have a tendency to slide under the gum, a ring cut from rubber tubing may be placed to encircle the neck, and allowed to remain in position for twenty-four hours. In this time it will be found to have forced the gum slightly back, and also by forming a space between the gum and tooth the free margin is left less resistant to pressure made by the clamp. Where the rubber ring would have a tendency to slip down toward the incisive edge, it cannot be used. In these cases a roll of cotton should be wrapped around the neck and forced under the gum as far as possible. A ligature of flax thread tied just below it will hold it in place, and in one day the swelling of the cotton will have accomplished the purpose. Either of these methods is less cruel than an attempt to force the gum up by use of a clamp.

Where a mouth is small, or the lips non-yielding, considerable difficulty may be found in placing the dam over posterior teeth. If the operator has an assistant, his aid is invaluable in placing the clamp, but in lieu of such help the patient may be made to do service. Suppose that the tooth be in the lower jaw ; the operator with the second finger of his left hand can readily keep the dam from sliding up along the buccal side of the tooth. Momentarily he has the second finger of his right hand at the lingual side. Now let him say to the patient, "Pass the second finger of your right hand down till you feel my finger-nail, then press against your gum, and hold steadily." Now the operator may remove his right hand, and is at liberty to place the clamp. The aid of the patient judiciously applied is frequently as useful to the dentist, and more satisfactory to the patient, than the help of a third person. In the upper jaw, however, the patient cannot assist so easily. He will get his hand in some awkward position, which interferes with a clear view of the work. Having placed the dam, using both hands, the second finger of the left hand along the buccal side, that hand may be turned so that the palm is uppermost. In this position, and without moving the second finger, the forefinger may be passed into the mouth and made to take the place of the finger of the right hand, which has been resting against the palate. The dam is thus held with the fingers of one hand, the tooth appearing between. The clamp may then be easily adjusted with the other hand.

Ligatures.—This subject comes up naturally in the consideration of the dam, but I shall speak of it not only in this connection, but from various other stand-points. Indeed, the ligature is more valuable in other work than when used merely to force the dam into place and hold it there.

To tie silk around the neck of a tooth is generally so painful that it should be resorted to as infrequently as possible. Where it must be done, the application of a four per cent. solution of cocaine, freshly prepared, will do much to alleviate the suffering.

Ordinarily a ligature is not needed in placing the dam ; certainly it is a rare case where more than two teeth need tying. In placing the dam over teeth, the edge of each hole naturally turns toward the incisive edges. If left so, leakage will result. By using a smooth flat burnisher, or other dull instrument, these edges may be pressed upward toward the gum till they become inverted. Immediately the contraction causes the edge to slide up under the free margin of the gum, so that unless the mouth is abnormally supplied with saliva the parts will be kept sufficiently dry for all practical purposes. This is a general principle, which, once noted, will cause the operator to use ligatures less and less frequently, as he becomes more and more dexterous in inverting the edges of the dam around the tooth-neck. When, because of the shape of the tooth or the superabundance of saliva, this cannot be relied on, a ligature is essential. It might seem unnecessary to tell how to tie a ligature, but there are numerous instances where a little more knowledge would benefit one who has but one way of doing this seemingly simple thing.

In the first place, how can the cord be tied tightest? and where is the best place to have the knot? It is easiest to tie a tight ligature around the central incisor, and the difficulty increases as the posterior teeth are approached. This is presuming that the knot is placed along the labial or buccal festoon. The reason is that while the hands are free at the median line, in the bicuspid or molar region the cheek prevents tension in one direction. There is a method, however, which overcomes this. Suppose that the cavity be in the approximal surface of a second bicuspid. In placing the ligature around the first bicuspid, pass it first between the two bicuspids, then around the first bicuspid so that the two ends protrude toward the buccal surface. Make a surgeon's double twist, and before drawing the knot tightly pass the proper end between the cuspid and bicuspid. The two ends may now be grasped and the knot tightened readily, because both hands have free play. The knot thus occurs between the cuspid and bicuspid. The second tie is made in the same way, except that a single twist is all that is necessary. Before cutting off the ends, pass the one which is on the buccal side down between the teeth, so that both protrude toward the palate. The ends, when cut off, are out of the way, and cannot stand up in the line of vision, as often occurs when the knot is made at the labial festoon. The ligature around the second bicuspid is made similarly, the knot occurring between that tooth and the molar.

While I advise placing the knot at the approximal side of a tooth, it should be occasionally along the labial festoon. We find anterior teeth, especially cuspids and lateral incisors, so shaped at the palatal festoon that it is very difficult to keep the dam from slipping down. If a ligature be used, and pressed up around the neck with an instrument, it is often found as soon as tied that it has passed above the dam, and nothing has been accomplished. This may be overcome by tying a good solid knot in the ligature first. When applied, this knot should be in line with the palatal sulcus. It gives a point of resistance for the instrument used to push it under the free margin of the gum, and carries the edge of the dam with it. When using this method, it is best to have the tying knot at the labial festoon, for being opposite the other it makes the ligature more secure. If it be desirable to have the loose ends out of sight, they may be carried between the teeth and cut off on the palatal side.

I now come to a description of ligaturing which may seem dry reading, because of the difficulty to describe knots in words. To him who has heard that teeth may be firmly united with flax threads, and has doubted it, I say, take a plaster cast and a piece of silk, then follow my directions by doing on the model what I describe, and the result will, I am sure, repay the trouble, and the reading will no longer be unprofitable. Unless this be done, even the assistance of illustrations will not render the description perfectly intelligible.

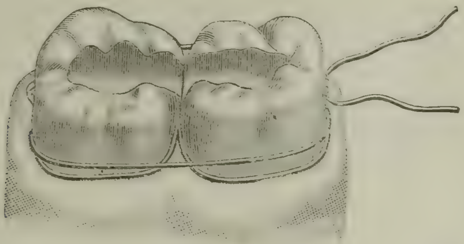
By many it has been claimed that we cannot fasten teeth permanently with ligatures. Certainly it cannot be done with wire, which either slips or breaks, and silk or flax it is said will loosen after a time. Again, the use of thread of any kind is considered uncleanly, because the brush will not remove the débris which accumulates between the ligature and the gum margin. This latter claim is due to the fact that most men tie a ligature *near the neck of the tooth*, if indeed it is not so placed as to actually impinge upon the gum. If such a ligature be worn for any considerable time, gingivitis will probably ensue. I will describe how to tie together a whole set of teeth, if there be need, so that they shall be held firmly, *the ligatures being about the middle of* *the teeth instead of at the necks.* Before doing so, I wish to touch on the use of ligatures in connection with the filling of teeth which are either loose or sore from wedging.

I shall first consider the last specified condition. Two teeth having been spread apart by wedging, are slightly loose, and sore to pressure. Because of some necessity, let us suppose that it is impossible to defer the operation. The teeth must be filled at once, yet the hand-pressure, or mallet, used for condensing the gold causes excruciating pain. Proceed as follows: Imagine that the cavities are at the median line, in the anterior approximal surfaces of the central incisors. The dam is made to include six teeth. A stout flax thread is waxed and passed between the lateral incisor and the cuspid on one side. A surgeon's double knot is made so that it occurs between the lateral and central incisors. This being firm, the two ends are passed around the central incisor, and the double twist drawn tightly along the anterior approximal surface; the central is thus drawn tightly against the lateral. The knot being completed, the two ends are next carried back and tied along the posterior surface of either the lateral or the cuspid, should the lateral not be firm enough to give good support. The same proceeding on the other side of the mouth produces the result that both central incisors are bound firmly to their neighbors. To complete the stability a wooden wedge must be forced between the incisors, giving all the space possible, and acting as a keystone to the arch. Teeth thus held may be filled with gold when otherwise they could not be touched.

When from pyorrhea or other causes a single tooth is found to be quite loose, it is frequently advisable to unite it to its neighbor with a gold filling. It has been advised to apply the dam and then encase the teeth with oxyphosphate of zinc (some use plaster of Paris). This is sometimes best, especially with the anterior lower teeth. Where the tooth is either a molar or a bicuspid, I have usually been able to obtain satisfactory stability by the use of ligatures. In Fig. 49 are shown a first and second molar, with a continuous groove from one to the other, and ligatures binding the two together. Only two rows of ligatures show, and these would be insufficient; but I have allowed the artist to draw but two, lest the figure be confusing. The dam being in position, the waxed flax is passed between the first molar and the bicuspid, and a double knot made between the molars, in the manner already described. Then the ends are carried back around the second molar and tightly tied along the posterior surface, the loose tooth, whichever it be, being thus drawn tightly against the firmer one. This is what I term the figure 8 ligature, and is to be followed by the figure 0, which is accomplished by bringing the ends around and tying them along the anterior surface of the first molar.

Fig. 49 *a*. Thus the two teeth are brought toward each other by different ways. In Fig. 49 the figure 8 ligature is seen nearest to the gum, and passing between the teeth, while the figure o is the higher one, seen to span the space. As has been already said, these two alone are not sufficient for the purpose, but a further stability is attained by repeating the process. If possible, the thread should be cut off at the outset long enough to serve for all the tying. If this be done, the next step would be to work backward once more, using the figure 8, and then forward again with the other. If the teeth are thus enwrapped six or eight times (that is, three or four of each), the loose tooth will not only be firmly held against the other, but will be supported so that the mallet does not cause pain.

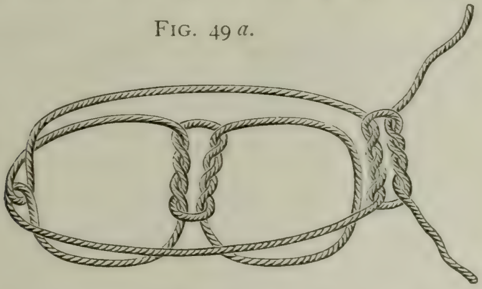
FIG. 49.



If the ligatures are well and neatly placed, one will lie above the other so that when completed they resemble tape.

I now come to the ligaturing of four or more teeth, whether for a temporary or permanent purpose. I may as well, perhaps, enumerate some of the circumstances wherein such tying becomes useful. Where teeth are badly loosened by pyorrhea, so that cure is either impossible or else must result only after a course of treatment covering a year or more, if they are to be united, it will probably be best to accomplish this by continuous gold filling or some method other than resorting to ligating. Where the disease is in an incipient stage, or where the teeth are in a mouth which it would be wrong to disfigure by a show of gold, then the ligature must be depended upon. Again,

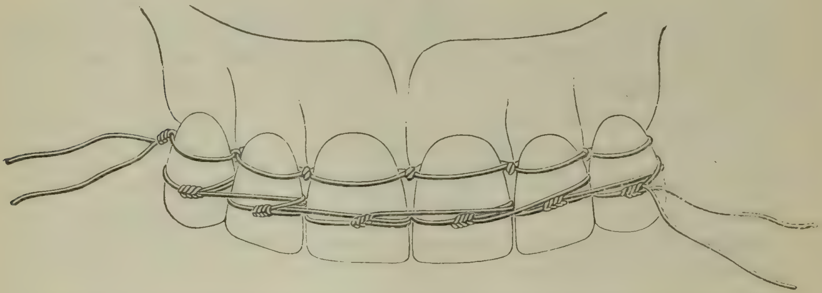
FIG. 49 *a*.



the flax thread may be relied upon in cases of teeth loosened by fracture; for holding regulated teeth during twenty-four hours while a retaining plate is being made; for the support of one or more loosened teeth, elongated so that shortening by file or corundum wheel is necessary; or for any purpose whatsoever where it is desired to hold for a period not exceeding six months, a number of teeth in a fixed position.

Let us imagine a case such as I was recently called upon to treat. A portly gentleman fell against a curb while crossing a street, and, striking against his upper lip, loosened the six anterior teeth, breaking the corners from one or two and chipping the others. Whether he calls immediately after the accident, or foolishly waits three weeks (as my patient did), until inflammation has set in and one or two fistulæ have appeared, the first thing to be done is to make the teeth firm. In the instance cited, I accomplished this with flax so well that not only were the teeth made so firm that mastication became at once possible, and under treatment all were saved, but I was enabled to grind the jagged edges from the teeth without discomfort, although before the tying it was painful for him to touch the teeth with his tongue.

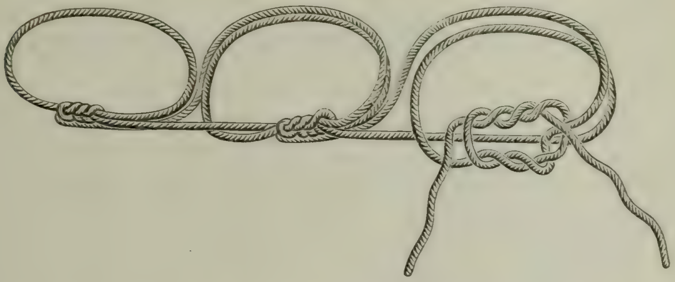
FIG. 50.



By the aid of Fig. 50 I will endeavor to show how this may be accomplished. In the figure are seen two rows of ligatures. The upper, or one nearest to the gum margin, is simply an extension of the figure 8 ligature, so that, as seen, it includes six teeth. One point must be mentioned in this connection. As already described, the double twist is made between the teeth and drawn tightly, one end of the thread being toward the palate and the other toward the lips. In the posterior teeth I have directed that the second half of the knot should be similarly made. In the incisor region the knot must be completed with both ends presenting at the labial aspect. By following this advice, the action of drawing the teeth together is attained while tightening the double twist between the teeth, but were the knot completed in the same manner it would make a bulge at that point which would prevent close contact when the next tooth was included. By having both ends at the labial aspect, the bulge of the knot occurs at the labial angle, where it cannot interfere. Thus the knot does not show in Fig. 49, while in Fig. 50 one is seen at every space. In the figure it may be observed that the ligature starting at the cuspid has been carried along, tying each tooth, till it finishes at the opposite cuspid, where the ends are seen. Once more I have left the work incomplete, lest the illustration should be confusing. In practice I should after reaching this second cuspid reverse the order of work and proceed backward again, tying in each tooth, till I ended where I had begun.

In Fig. 50 is seen a row of ligatures nearer the cutting-edges of the teeth. These are applied in a different manner, and this method I term "weaving." If the reader will consult Fig. 50 *a*, or else operate on a model as before suggested, this most valuable method will be made clear. In this case the tying is begun around the right cuspid, the knot being made at the center of the labial surface. There are now two loose ends. One is carried inward, passing between the cuspid and the lateral incisor, then outward between the lateral and central incisors. The other end is carried straight across the space, passed inward between the lateral and central incisors, and then outward between the lateral incisor and the cuspid. Then the ends are tied once more into a knot, this time at the center of the labial surface of the lateral incisor. In a similar way the "weaving" is continued till the opposite cuspid is reached, when the ends are cut off short, no effort being made to return. In some instances I use both these methods on the same set of teeth, as, for example, in cases of fracture, but I must call attention to the fact that they are totally different in their action. The figure 8 simply draws the teeth together laterally, while the "weaving" will force outward any tooth which stands within the arch. This in many cases is desirable, while in others it is to be avoided. Where the four inferior incisors are loose, and the cuspids either absent or of such form that a ligature cannot be tied securely, if the weaving method were used about the four teeth

FIG. 50 *a*.



the result would be that they would stand in a straight line, which would be mischievous. In such a case the arch must be braced with the figure 8 ligature first. If the cuspids cannot be utilized, then begin around a bicuspid and skip around the cuspid. On the other hand, it sometimes occurs that, though all the teeth are loose, one is much more so and stands within the arch. Here the weaving alone will usually not only be sufficient, but will force the irregular tooth into proper position.

It is noticed that in the figure both rows of ligatures are well away from the gum line. To accomplish this the dam must be placed, and just before tying in each tooth the labial and lingual surfaces should be smeared lightly with sandarac varnish. Ligatures thus treated, and tied by any of the methods described, flax thread being used, will not slip for several months and are clean. Of course, all thread should be waxed.

(To be continued.)

ADAPTATION OF FUNCTION OR ORGAN—WHICH?

BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

In the August number of the Dental Cosmos there appeared a paper read before the Dental Society of the State of New York, under the title of "The Quantitative and Qualitative Rise and Fall of Teeth in their Relations to Work," by Dr. J. Edw. Line. In closing the discussion that followed the reading of the paper, the author states "that it was his intention to refer to deeper considerations that come under the head of sexual characteristics and temperaments." It is most unfortunate that he did not carry out his original intention, and especially so if it would have enabled him to have better defined his views and position. Certainly the paper as published is not clear either in the argument or the conclusion. The statements made regarding the "grass crop," as well as the "human hair," have no correspondence whatever with the evolution or disintegration, and retrograde metamorphosis of the teeth. They are not matters of fact in the light of the evidence. How many lawns with velvety turfs have been for ten, fifteen, or twenty years regularly mown every week for twenty-five weeks each year without a root being thrown out or a bare place discovered; and why? because the constant cutting of the top has made a demand upon the roots for their extension to provide nourishment for the waste, hence such grass plots become tough and resisting. The same is true of pasture fields; hundreds of them are pastured to the extent of their reproducing power for twenty, yes, thirty years, not a bare place in them; but quite the reverse is true. The roots have become so extended and matted together that a plow to penetrate would require double the amount of force essential for ordinary ground. Let us now glance at fields where the grass is allowed to mature. Here we have an illustration of the fact that the first object in view of all living things is to provide for their perpetuation, and then the energies subside. The farmer well knows that he never procures more than one good crop of clover hay from his field where it has well matured before mowing, and of timothy and other grasses two full crops of matured hay is the extent, when the field must again come under cultivation. Every well-regulated farm brings every field under cultivation with the round of corn, oats, and wheat every seven years, allowing only four years at most, but usually three, in grass; and why? simply that the roots of grass having perfected their object in providing for their reproduction, die out and become unprofitable to longer remain.

Our essayist has certainly not followed the industry of farming, or he could not have published the statement to which we refer. In regard to the human hair I am sorry the statistics cannot be furnished, but of the whole number of people existing the proportion who have lost their hair is very, very small when compared with the number who regularly three, four, or five times yearly have their hair cut. When hair has a tendency to fall out, it is generally recommended that it be cut short, even to shaving the head in extreme cases. Nor is there any evidence that women are less frequently bald because their hair is left to grow. The disadvantage in this respect from which men suffer may be found in the head-dress. The custom of wearing a stiff silk or beaver hat, from its close adaptation to the head, cuts off the circulation; and not only this, the hat is with many worn from habit in the house or at such times when it could well be spared, so that the hair, or rather scalp, is subjected to a degree of heat and deficiency of nutrition, which must necessarily operate to its disadvantage. If we can interpret him aright, the idea he means to convey is, that there is in all beings, vegetable as well as animal, a constant, unremitting effort of adaptation to environment, and as this environment changes, so there is a corresponding change in function, with function modifying structure, or else a succumbing to its influence, with only a "survival of the fittest." Also, that impulses or influences of a *similar kind*, continuously acting, produce great changes, and long-continued repetition of these impulses notably alters the hardest and most enduring of structures; this being accomplished through the *cells* composing the living tissues by each impulse being registered by some (though it may be ever so slight) alteration in their physical condition, and that these alterations, modifications, or adaptations of each individual being, plant or animal, organ or organism, have a tendency to be transmitted to the offspring; or, to place it more accurately, the offspring pass through these evolutionary changes more easily and quickly than the parent did. And so changes or modifications in this way become cumulative. These are the facts in the modification of structures, but has the essayist been fortunate in the illustrations he has given? We think not.

On page 629, the following statement occurs: "Supply and demand between respectively what is required and the object or part requiring the same, is constantly subject to the conditions of adjustment." Also, "Teeth are no exception to the rule that applies so generously to other things." Now this may all be true, but in the application he makes of it the statement is without force, and he does not in his article anywhere fully recognize the fact that use and disuse are very important factors in regulating supply and demand.

These (use and disuse) react on growth-force, producing changes in form, structure, and relative size of parts. Such changes are transmitted, and when advantageous to plant or animal become integrated through subsequent generations. It is this integration and repetition of this change in its entirety that gives it a fixity, and makes plants or animals, tissues or organs, valuable because of the desirable acquired qualities which have now become so fixed that they are reproduced in offspring with a degree of certainty. It is a little difficult to understand just what idea the author means to convey when he says, "Beginning thus, and in a small way, we have a quantitative rise or increase in dental tissue. The pair becomes four, the quartet eight, until twenty is attained, when, after an apparent lull, four more are added and a struggle for place fairly ensues." Now the fact is the full number of teeth with which man is blessed, either in his immature or mature condition, was established by use long before man had attained his present intellectual status, and now the disuse factor, together with a diversion of nutrition to other acquired and advantageous parts, is acting to reduce the room previously occupied by these. the established number of teeth; and the same factor—disuse and diversion—will continue to act until we have a harmonious adjustment or a correspondence between the number of teeth developed and the number needed or required, together with the space they demand for normal and efficient position.

Again we quote: "Decayed temporary and decayed permanent teeth are the rule, and our assumption is that they are thus defective simply for the want of something to do." This is but partially true. There is another important factor which must not be overlooked,—*local environment*, which exerts an influence in greater or less degree in proportion as use or function has kept up the nutritive supply. Now the absence or diversion of this nutritive supply is an important predisposing cause, but not the active disintegrating factor. This latter we obtain first from abnormal secretions or environment, then with their lesions of structure the teeth offer habitat and pabulum for the myriads of micro-organisms which greatly facilitate this disintegrating process.

The author is certainly a little imaginative or poetical when he gives us the following: "Nature proceeds to rid herself of incumbrances, and the earliest evidences of such effort are found in decay of the deciduous teeth. They melt away, the pulps die, and finally the gum lets go; and the rational explanation is that their work was not sufficient to enable them to appropriate and assimilate what was brought to their door, or what was brought proved too scant for support. . . . It may be noticed in this connection that it is not until teeth become numerous that decay begins. A few teeth have much to do; but an increase in number means diminution in labor, and at once there is a reduction in the quantity of tissue: it is cut out by the process of decay. This continues, attacking every tooth, perhaps, until the series is broken by the loss bodily of several of its members, when there is cessation of decay until the balance between supply and demand is again disturbed." The remainder of page 630 of the essay might also be quoted, but it is unnecessary, as the reader can readily refer to it as embracing what we deem the misapprehensions of the author.

First, the deciduous teeth are not incumbrances, and the fact that a certain proportion of them decay early in life is not necessarily any evidence of it. The presence of decay is simply an evidence of a want of harmony between the tooth or its structure and its environment, or, to state it in plainer English, the presence of decay is positive evidence that the secretions surrounding the tooth have the power of producing a molecular disintegration of tooth-structure,—decalcification,—that is all. On the other hand, the fact that thousands of children erupt their twenty deciduous teeth and retain them without a blemish until by physiological process the roots are removed and the crowns drop off to give place to their successors, is proof positive that they are still an important factor in the economy of nature. Nor is there, in my judgment, any evidence to sustain the statement that decay attacks the teeth when there are ten, fifteen, or twenty in the mouth, while it would not attack them while four, six, or eight only were in the mouth; and for the reason he assigns, that because the greater number had taxed the nutritive supply to an exhausting extent. It is true that decay is often found present in the mouth at the age of thirty, forty, or sixty months, while at eight, ten, or twenty months it is not present; but let us remember that there are numerous factors which will suggest themselves, both local and constitutional, that may be instrumental in producing this change of structure, without any evidence that the nutritive supply has been deficient, save temporarily, through systemic disturbances, just as we may have both deciduous and permanent teeth defective from their earliest appearance (vices in both quality and quantity of tooth-structure), from imperfect nutrition through general or systemic disturbances. Let us remember that man in his dentition is heterodont; and for the reason that the teeth located in different parts of the jaw are all subjected to different forces, hence the shapes that have been established are not arbitrary, but fixed, through the influence of mechanical forces acting through ages of time and unlimited generations, and there is no evidence whatever that the loss of one or more teeth will to the extent of being a factor in their preservation give the remaining number more work to do; indeed, quite the reverse is true, and true because the force brought upon the incisors and cuspids is very different from that on the molars, and at a different time, so it cannot possibly have the influence he assigns, and the preservative force must be looked for in some other quarter. Nor is it a fact that in proportion as a tooth is decayed it lessens its demand upon the nutritive forces. The very moment decay attacks the tooth, that moment, ordinarily, there is a greater demand made for nutrition, and this is evidenced by an irritability of the pulp, which is so frequently a concomitant of both superficial and deep-seated caries. This irritability being the result of messages sent to the brain for assistance, so blood is sent to the pulp, and from this hyper-nutrition the liquor sanguinis element carries the mineral salts into the tubuli, and under favorable conditions thereby aids in staying the progress of disease and protecting the pulp.

The statement that when the crowns are gone "the gum lets go" and the roots are dislodged, is the inference to be drawn. But is this the case? How often do we have to remove roots with force and forceps, to the great discomfort of the patient, whether they be those of the deciduous or the permanent set!

The doctor ought to know that neither cervical decay nor erosion can in any way lessen the demand the tooth makes for pabulum, but in the majority of cases has increased it, for in erosion we have the tubuli and pulp-chamber consolidated and the root excementosed, while in cervical decay the tooth will make its best effort for nutrition, but the systemic conditions may have failed to supply it through some cause which may be, and probably is, temporary and subject to correction by general treatment. The author says "teeth do decay extensively and stop," and we may add, after a period, commence again; but what does it prove? Simply that systemic or local conditions, or both, have changed, but temporarily only, and the amount of tooth-tissue to be fed has nothing whatever to do with it. Artificial teeth, when well adjusted, do not, cannot, cause decay of natural ones *by relieving the latter of their work*, for the reason, as above stated, that all the teeth in the mouth are never brought into active service with the same force at the same moment, the force being applied differently in different localities.

That the teeth are subject to ordinary evolutionary forces, I fully concur with the author of the paper under consideration. That is, that environment may affect both function and structure, and that this changed function and structure may be transmitted and finally integrated and made permanent in subsequent generations. I believe that use and disuse of teeth, as well as of other organs, influence growth-force, and so produce changes in form and structure. I also believe that such structures, teeth included, as best subserve the purpose of the animal, under the law of the "survival of the fittest," are transmitted and become fixed,—fixed because the economy of nature demands just that tool which can do the most efficient service with the least amount of friction ; but our good friend Dr. Line has been unfortunate, and I think unphysiological, in the illustrations he has brought forward to prove his hypothesis.

PHAGOCYTOSIS.

BY H. A. SMITH, D.D.S., CINCINNATI, OHIO.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 5, 1891.)

A CORRECT knowledge of the nature and life of cells forms the basis of physiology.

A cell may be defined as a nucleated mass of protoplasm of microscopic size which "possesses sufficient individuality to form a life history of its own." Originating from some pre-existing cell, it grows, reproduces itself, and dies.

The vital or physiological activities of protoplasm may be studied in the amœba. They are :

1. Power of spontaneous movement, called amœboid movement.
2. Irritability and power of response to stimuli.
3. Nutritive powers : the ability to take in food, and build up tissues by assimilation, and to reject what is not assimilated.
4. Reproductive powers.
5. Decay and death.

Our purpose now, however, is to call attention to the white corpuscles or leucocytes of the human blood, and to refer especially to their amœboid movement, first described by Wharton Jones. These leucocytes are simply spherical masses of protoplasm without cell-wall. The power of spontaneous movement is manifested by the mass in lengthening itself in one direction, and then flowing the whole mass into the process, and thus the cell changes position. Its nutritive power is exhibited through this prolongation or tentacle in seizing the food and drawing it into its mass. Because of these vital or physiological qualities, the white blood-cells have been called by the eminent Russian zoölogist, Metschnikoff, phagocytes, or devourers. In the popular scientific literature of the day concerning these cells, they have been called warrior-cells, eating cells, wandering cells, chimney-sweeps of the blood, etc., names indicating that in a way peculiar to themselves they assist in purifying the blood. Having the ability to seize upon the waste products of the system, it is also supposed that the phagocytes prey upon all small foreign bodies in the blood, organic or inorganic dead or living, including diseased germs and all invading bacteria.

The plausibility of Metschnikoff's phagocytic theory and its acceptance by some of the best-known morphologists of the world has suggested that perhaps some of the mysterious phenomena observed in the treatment of disease by the dental practitioner might be explained by the devouring function of the leucocytes.

In the January number of the Buffalo *Dental Advertiser*, Dr. Frank W. Low has given us an interesting paper entitled "Phagocytosis." Following an exposition of the theory, he says, "In the existence of the phagocytes we have an intelligent explanation of the successful outcome of much of the careless immediate root-filling which is undoubtedly being done the whole country over." He believes that when teeth, treated with dry hot air and mechanical cleansing, speedily assume healthy relations with the surrounding tissues, the phagocytic cells act as the factors of elimination, devouring all bacteria both in the pulp-canal and in the tissues about the apex of the roots. Dr. Low ventures the opinion that phagocytes may penetrate the dentinal tubuli of the root from the pulp-canal. It is doubtful if the smallest blood-corpuscle could enter these tubuli, especially if the root-canal is surrounded with a dense layer of dentine, as recently described by Professor Miller. If the dental pulp is invaded by putrefactive micro-organisms through a point of exposure or by way of the vessels entering the pulp through the foramen, these wandering cells may and probably do enter with the blood supplied to the pulp. Dr. Low believes that when stasis is complete the battle goes against the phagocyte, because reinforcements cannot come to the rescue, while the bacteria proliferate without hinderance in the dead pulp-tissue.

Pulps sometimes die from injury to teeth, the crowns of which are sound. In these cases the pulp may or may not become putrefactive. In those cases in which the pulp atrophies or remains moist and, as we say, sweet, it may be assumed that the bacteria circulating in the blood and carried to the injured tissues at the apical space have not entered the pulp. In cases in which the injury has been severe and inflammation confined more nearly about the apex of the root, we are less likely to have a putrefactive pulp and attendant abscess. The severe injury is followed by prompt and decided inflammatory reaction, in which the leucocytes pass out freely into the inflamed area and readily devour the pyogenic cocci present in the damaged tissue.

Dr. Low gives the details of several bacteriological experiments with teeth containing infected pulps, and concludes : "But one inference can be drawn from results observed : that the phagocytic cells act as the factors of elimination, devouring all bacteria, both in the pulp-canal and the tissues about the apex of the root."

The cause of the disease known as pyorrhea alveolaris has not yet been determined. It is, however, generally agreed that pathogenic bacteria are always present in the disease. As a means of cure, very much has been claimed for the heroic surgical treatment as practiced by the late Dr. Riggs and others since his day. How the injury to the tissues resulting from this mode of treatment exerts a curative effect has been an enigma. May it not be naturally explained by the phagocytic action of the leucocytes, which crowd in when the fibrinous degree of inflammation following tissual injury is reached? The bacteria always present, both specific and non-specific, are devoured, and naturally the inflammatory process ends with the formation of new or cicatricial tissue. Then it is said we have a cure.

If pyorrhea is caused by a micro-organism and is an infectious disease, we have here an instance where the inflammation excited by a particular microbe becomes through the medium of leucocytes the cause of its own destruction.

We have been taught to place great reliance upon the so-called vital resisting power of the tissues. No doubt the living tissues exert a great influence in checking the development of bacteria in the diseased conditions I have mentioned, as well as in others we are called upon to treat ; but it is only when we fully recognize the phagocytic action of the white blood-corpuscles that much which is obscure in treatment is rendered comprehensible. However, a belief in phagocytosis should not lead us to relax in the least the application of the most thorough antiseptic methods in our daily practice. The study of antiseptics and the intelligent use of antiseptic agents have done more than all else to cause dentistry to be classed among the arts preservative.

Antisepsis and phagocytosis, then, are both important factors in the treatment and cure of oral germ diseases, and should both alike receive our careful attention.

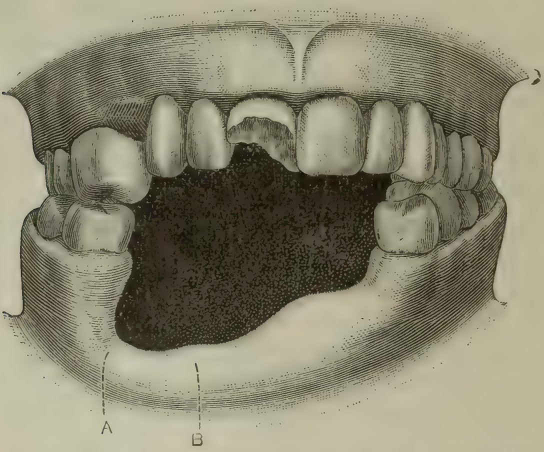
FRACTURE OF THE LOWER MAXILLA BY A GUNSHOT WOUND. TREATMENT BY AN INTERDENTAL SPLINT BRIDGE.

BY J. D. PATTERSON, D.D.S., KANSAS CITY, MO.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 6, 1891.)

THE patient, Quartermaster-sergeant Charles Campbell, of the Seventh United States Cavalry, in the battle with the Indians at Wounded Knee, near the Pine Ridge Agency, was struck on the lower maxilla with a ball (from a Winchester rifle, presumably), and the anterior part of the maxilla from the second bicuspid upon the right to the second molar upon the left side shattered. Shortly after the fight, such surgical care as was possible was given the case. The loose teeth and parts of the alveolar process and bone below which were entirely loose were removed, and the wound in the lips and cheek stitched together. It was thought possible at first that there might be union between the remaining partially-detached fragments, but gradually piece after piece came away, until at a point in the region of the right cuspid for the space of about six lines the bone (Fig. 1, A, B) was entirely gone, leaving the remaining posterior parts freely movable.

FIG. 1.



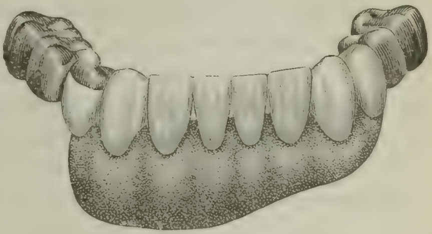
Six weeks after the injury the patient was brought to me presenting the following condition: The outside wounds had healed with considerable cicatricial tissue; the left fragment of the maxilla was easily movable, and an abscess was discharging freely upon the face opposite the loose end, with another abscess opening under the chin near the symphysis; the left side of the jaw was much firmer than the right, but had healed far inside—about a half-inch—from the normal position. There was still considerable swelling, and small spiculæ of bone frequently made their way to the surface. The lower jaw was of course entirely useless, and was kept tightly bandaged to the upper.

The first treatment instituted was as follows : I found that a bridge-splint placed upon the parts as presented would result in retaining the incorrect position of the left side, and that pressure brought to bear to force the pieces apart would result in still greater deformity, because the more easily movable right fragment would give way, leaving the left in its former position. The first step then was (if possible) to remedy the distorted position of the left side. I proceeded as follows : I banded the first lower molar upon the right side and also the first upper molar upon the same side, attaching lugs to the bands for the reception of a screw, and firmly screwed them together. I then placed a jack-screw upon these molars on the palatal side and against the molar on the left side, and forced that side into its correct position, which had been determined by models beforehand. I then banded the upper and lower teeth upon this side as upon the other, and screwed them firmly together.

I then dismissed the patient for ten weeks, the intention being to overcome the growth of cicatricial tissue which forced the left side against the tongue. I believed the abscesses were caused by the movement of the loose ends upon the soft tissue, and the result proved that this surmise was correct, as they soon healed after the parts were secured firmly to the upper jaw.

At the end of three months the patient returned. He reported himself as very comfortable, save only that he was limited entirely to soft foods. On the removal of the bands the left side, after two or three days, swerved slightly inward and there remained, not quite, but nearly in correct position. I then proceeded to make the splint-bridge shown in the cut (Fig. 2). No details are necessary in describing this to any experienced bridge-workman. It is a splint as well as bridge. In restoring the contour of the lower lip and lost portion of jaw, rubber is vulcanized to the bridge. It has been worn for six months, and the patient, whom I saw four weeks ago, says he is a new man, and his appearance holds the statement true. He eats solid foods with comfort, and the splint-bridge is a success. I am watching the case as to the growth of new bone where it is entirely gone. He is a young man in good health, and the chances for this are good.

FIG. 2.



In conclusion, I take great pleasure in bringing this rare case before you, because it shows how the dental profession can supplement the best that the surgeon can do, and gain a result which makes life to this patient once more a pleasure.

The surgeon at Fort Riley, Captain Hoff, had care of the outside wounds on the lip, and succeeded admirably in preventing permanent disfigurement. I am indebted to him for intelligent assistance in after-care of the case.

PYOKTANIN BLUE IN THE TREATMENT OF CANCEROUS GROWTHS, WITH ONE CASE IN ILLUSTRATION.

BY JOHN S. MARSHALL, M.D., CHICAGO, ILL.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 5, 1891.)

MR. PRESIDENT AND GENTLEMEN : I desire to call your attention to the new antiseptic drug, pyoktanin, and its use in the treatment of cancerous growths.

Pyoktanin was discovered by Professor J. Stilling, of Strasburg, Germany. It is one of the aniline compounds and a powerful antiseptic.

There are two varieties of the drug, one of a yellow color and the other a deep blue ; each produces a corresponding deep stain. The blue dye has greater antiseptic powers than the yellow, and is generally given the preference when the deep purple color imparted to the tissues by its use is not objectionable.

Professor Stilling and Dr. Wortmann, after making careful and elaborate chemical and bacteriological research, claim for pyoktanin as an antiseptic, that,—

"1. It has no injurious effects upon the human organism.

"2. It is absolutely destructive to all bacteria or other micro-organisms absorbing it, and

"3. It rapidly permeates and diffuses through both healthy and diseased tissues and fluids, and penetrates the enveloping membranes and internal matter of all bacterial colonies harbored by them."

For antiseptic purposes it is used in aqueous solution, the strength ranging from 1 in 1000 to 1 in 100, the parts being irrigated or painted with the solution. The only objection to its use by these methods is the discoloration imparted to the surrounding tissues and the staining of the clothing ; these stains, however, are easily removed by washing in alcohol.

Dr. H. J. Bolt, of New York,* speaks very highly of pyoktanin blue as an antiseptic in connection with the treatment of various suppurative and purulent conditions coming under the notice of the gynecologist.

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* *Journal American Medical Association*, July 11, 1891, p. 76.

Dr. Roswell Park, of Buffalo, says, in "Annals of Surgery," that "pyoktanin cannot be relied upon in surgical practice except in such strength as to make it dangerous. In gonorrhœa it is disappointing. Upon granulating surfaces it exerts a desirable effect, but is no more valuable than other substances as easy of access, while the stain is often objectionable. In ophthalmological practice it has not come up to the requirements of the day. It has few qualities not possessed by numerous other drugs of its class, and on the whole it is disappointing."

For a few weeks I have been testing its value as an antiseptic in the treatment of phagedenic pericementitis, but I am not prepared to give the results of these experiments at this time, as it is my intention to present them to the profession in the form of a separate paper. This much, however, I may say in regard to it, that it gives promise of being a valuable addition to our yet very meager armamentarium for combating the effects of this disease.

The field, however, in which at present it seems to give the greatest promise of usefulness is in cases of cancerous growths of all varieties which have passed beyond the hope of successful removal with the cautery or the knife; by mitigating the sufferings and prolonging the life of unfortunate individuals who may be thus afflicted. Although no positive cures have yet been announced as resulting from its use, many have been greatly benefited, and some few have been so far improved as to hold out the *hope* of a positive cure.

In an article by Dr. Willy Meyer, of the German and New York Skin and Cancer Hospital, which appeared in the *Medical Record* of April 25, 1891, will be found a *résumé* of the opinions of the most eminent German surgeons upon its use and value in the treatment of cancerous growths, with the cases upon which it had been used, the results so far obtained, and histories of four cases treated by himself.

Let me quote a few paragraphs from this most interesting paper:

"Stilling mentions in his second paper that he succeeded in curing with pyoktanin an extensive exulcerated epithelioma of the face (ulcus rodens) which, beginning in the middle of the dorsum of the nose, involved the entire wall of the lachrymal sac and half of the upper eyelid. He first sterilized the surface with a large pyoktanin stick, and then powdered the pure substance on the formed eschar. This procedure was repeated a number of times. A hard cover was thus formed, which could not be pulled off. It came off by itself after a number of weeks, and underneath a smooth cicatrix presented itself. The eyelid, of course, was contracted. He states this case to show how effective the aniline dye can be even in such cases under special favorable circumstances, and not to claim to have found a remedy for cancer. In another case, which seemed to be much more favorable, this kind of application had no success whatever.

"On January 30, 1891, Professor v. Mosetig-Moorhoof read a very interesting paper before the Vienna Society of Physicians, 'A Contribution to the Treatment of Inoperable Malignant Growths,' in which he reported his experience with pyoktanin in such cases. In the treatise referred to, a number of cases are reported which demonstrate that in pyoktanin a remedy seems to have been found which possibly can bring help in cases of inoperable malignant growths, where formerly the patient and doctor seemed to be absolutely helpless."

Stilling was the first to suggest parenchymatous injections of aniline dyes in inoperable neoplasms, and advised the use of such dyes as will dissolve slowly in a 0.6 per cent. solution of chloride of sodium, viz: blood. He recommends this precaution to guard against the too rapid diffusion of the injected fluid through the tissues and the possibility of the dye entering the blood, as he feared that the absorption of too large a quantity by the red corpuscles might possibly destroy their function and thus endanger life. He is of the opinion that the blue dye is best for parenchymatous injection, as it is the most powerful antiseptic of this class of drugs and is soluble in only 0.7 to 0.8 part in 1000 of water.

With regard to its practical application to cancerous growths he suggests the employment of Von Nussbaum's method of treatment, which is to tie the principal arteries which supply the neoplasm to arrest its growth, and afterward to inject the tumor in all its parts with a solution of pyoktanin blue.

"Von Mosetig presented four of his cases, previously referred to, at a recent meeting of the Vienna Society of Physicians (March 13). The patients had all been materially improved, but were not yet cured. He is inclined to avoid injection into the tumors which involve large veins, and also into those which cannot easily be reached by the needle of the syringe. He now prefers a solution of 1 to 500 as a standard solution, which is filtered through heated asbestos to remove undissolved crystals, which might plug the needle, and makes the injections in a concentric manner, letting his needle enter into the surrounding healthy tissues. Von Mosetig does not share Stilling's fear that too large an amount of the dye could enter the blood and thus do harm by staining the red blood-corpuscles. In several hundreds of these injections neither he nor his assistants have ever seen any untoward accident. Microscopical examination of extirpated pieces of three different new growths which had been injected—made by Riehl, of Vienna—demonstrated that the nerves, muscles, connective tissues, and young epithelial cells were diffusely dyed, but the nuclei only slightly or not at all. To explain this phenomenon, and at the same time the necrobiosis or fatty degeneration and resorption of the growths after the injections (which in his opinion can only take place if the cells and the cell-nuclei of the neoplasm themselves have really been affected by the pyoktanin), Von Mosetig advances the hypothesis that the pathological cells or their nuclei contain a specific chemical substance, which is able to reduce the aniline dyes in such a way that the latter lose their blue color ; in other words, that this at present unknown substance reduces the blue aniline dyes to white,—that is, leukaniline. When the tumor has been extirpated and sections have been prepared from it for microscopical examination, the leukaniline in them, being exposed to the oxygen of the air, turns blue again.

"Billroth is rather skeptical in regard to the value of pyoktanin injections in cases of malignant growths. Three patients, having far-advanced sarcoma (posterior aspect of thigh, sternum, popliteal space), got worse; one of them died of sepsis. The tumors were softened and the covering skin was perforated. This occurrence can only be looked upon, according to Billroth, as unfortunate to the patient. The exulcerated growth troubles the patients much more and will render their condition more dangerous. Patients afflicted with exulcerated growths also did not improve. Billroth does not believe that pyoktanin, when injected, has any specific influence whatsoever, but that it is merely the water, which, forcibly pressed into the tissues, makes them swell and later unable to live. The researches are continued in his clinic."

Dr. Meyer reports having tested the value of the drug in nine cases at the hospitals and two cases in private practice. The histories only of the first four hospital cases are related in his paper.

It would be extremely interesting to review in detail the histories of these cases, did time and space permit ; but it will be sufficient for our present purpose to say that the report shows that marked improvement followed the treatment in each case ; the severity of the pain was greatly mitigated, the diseased tissue took on a more healthy appearance, and in every case the tendency to spread to adjoining tissue seemed to be arrested.

In summing up his experience with pyoktanin, Dr. Meyer says,—

"In reviewing these four histories, and also considering my experience with pyoktanin as well as ethyl pyoktanin in my private patients, I should like to state the following facts in regard to the treatment of inoperable malignant growths with these aniline dyes, as far as they have been exhibited up to date (April 8).

"The aniline dyes, applied on the surface of exulcerated growths in ointment or powder (about 1 to 200), or in substance, have a strong analgesic effect.

"Parenchymatous injections of pyoktanin solution, 1 to 300, repeated every second day till the fifth day, the dose not exceeding one and one-half drachm, have in my cases proved to be innocuous to the general system.

"The symptoms following the injections are either general or local.

"The general symptoms, which can also follow the internal use of methyl-blue (as recommended for inoperable malignant neoplasms by Dr. Max Einhorn, of this city), are nausea or vomiting, weak and slow pulse, headaches, general malaise. These symptoms may come on the same day or the day following the injection ; as a rule, they do not come at all ; now and then there is a slight rise of temperature, usually subsiding within twenty-four to forty-eight hours.

"The local symptoms are :

"1. Pain following the injection. It may be of long or short duration, slight or severe. It is more severe where the cancerous infiltration affected by the injection is dense (epithelioma of face, disseminated cancer of breast, etc.). It seems that local anesthesia may follow the injection.

"2. Œdema, coming on either acutely, and then accompanied with slight redness (non-inflammatory) and pain on pressure, or rather in a sub-acute form. This serous transudation of the growth may be the first step to resorption. The slight fever, observed in a number of patients, soon following the injection had then to be looked at as being an aseptic one, possibly due to this resorption.

"3. Breaking down of the injected tissue, with perforation of the skin or scar, which latter is the result of the operation (aseptic necrosis). By using a stronger solution, 1 to 200, the necrobiosis seems to be more rapid in smaller nodules. It may be advisable to use a weaker solution, 1 to 500, instead of 1 to 300, as we can thus dye a larger portion of the growth in one sitting, without increasing the dose of pyoktanin. We then inject a larger quantity of solution and still need not apprehend general symptoms. Perhaps the weaker solution will not destroy the tissue so rapidly, and thus rather induce resorption than necrosis. The sinus or sinuses established by the breaking down of the tissues give exit to a thick, dark-blue fluid, which, by microscopical examination, proves to be not colored pus, but débris of the injected neoplasm. It is generally intermingled with shreds of necrosed tissue. We also have to prove yet whether operative interference in this stage will really benefit our patients. Perhaps nature gets slowly rid of the necrosed tissue without help. As it seems, the carcinoma tends more to necrobiosis and perforation during this treatment than the sarcoma. I personally could, so far, only subject cancer cases to the color cure. (V. Mosetig had his most striking results in patients suffering from sarcoma [see above]. He maintains that the injections, made under antiseptic precautions, into neoplasms which are still covered by healthy skin produce necrobiosis and fatty degeneration, which is not followed by perforation, but by resorption.

Billroth, on the other hand, saw rapid softening and perforation in two out of three patients who suffered from sarcoma and were treated with the injections.)

"4. Breaking down of the injected tissue (necrobiosis), with subsequent resorption (Cf. 3). This will probably be seen oftener if we stop the injections for some time as soon as spots in the growth have softened, and only start them again after those spots have shrunk, provided, of course, that they did not perforate. Small, hard nodules in the skin, as seen especially in the disseminated cancer (recurring cancer of breast), can entirely disappear in a very few days, even if the pyoktanin solution was injected into their base. Perhaps the rapid disappearance is not resorption, but only an illusion, which is caused by œdema of the immediate surrounding tissue. A number of the nodules reappear after a few weeks, sometimes rather multiplied. The attempt at dyeing these small nodules directly, by pushing the needle right into them, is frequently unsuccessful, even in regard to the microscopical appearance, and causes severe pain.

"An infiltration of hitherto healthy tissue with the neoplasm, in consequence of this treatment, has not been observed in a single case.

"In no case did the growth spread during the treatment.

"Applications of pyoktanin in substance on exulcerated tumors slowly remove the diseased tissue in the shape of dry gangrene. There is no suppuration under the eschar, on account of the strong antiseptic qualities of the dye, and consequently no cachexia. Pyoktanin is, however, not a deodorizer. It is also not a styptic.

"It may be advisable to combine the parenchymatous injections and local application of pyoktanin with the administration of aniline dyes internally. Pyoktanin is, in my cases at least, not borne by the stomach. Methyl-blue seems at present to be the most preferable."

The reading of Dr. Meyer's paper greatly interested me from the surgical stand-point, for it so happened that just at that time a private patient, Mr. H., American, aged forty-one, general health good, family history good, referred to me by Professor Arthur B. Freeman, was suffering from a very extensive malignant neoplasm (small, round-cell sarcoma), originating in the antrum of Highmore, involving the right superior maxilla and malar bones, etc.

An operation, with the assistance of Professor Freeman, had been made for the removal of the growth in the antrum on April 2, 1891, but so rapid was the extension of the disease following this procedure that the second one, with the assistance of Professor John Owen, was performed on May 12 following, when the entire right superior maxilla, malar, palate, and turbinated bones, with portions of the sphenoid, were removed. The first manifestations of the disease were discovered only six weeks before the first operation. Ten days afterward, when the patient was allowed to leave the hospital for his home, there was forming over the right ramus of the inferior maxilla an extensive induration or infiltration.*

It was determined, with the consent of the patient, that if there should be positive indications of further spreading of the disease or recurrence, we would immediately begin the use of pyoktanin by parenchymatous injection. I was led to this determination by the hope held out in the results which had followed its use in cases of a similar nature reported by Von Mosetig-Moorhof.

May 28, the induration over the right ramus had assumed the size and shape of a hen's egg, somewhat flattened laterally, and was unmistakably a further extension of the disease. Parenchymatous injections of a solution of pyoktanin, 1 to 500 in a 0.6 per cent. solution of sodium chloride in distilled water, were commenced at this date. Twenty minims were injected into the substance of the growth at four different points, five minims at each point. The utmost care was used to insure perfect aseptic conditions of the external surface of the tumor, the needles and syringe, the hands of the operator and the nurse, and in the preparation of the solution itself.

The following day the axillary temperature showed an elevation of one degree (at 9 A.M. it was 98.4°, at 2 P.M. it was 99.4°), which fell to normal in the evening. No other general symptoms were manifested.

May 31. Parenchymatous injection of pyoktanin, twenty-five minims at five different locations, five minims at each place. Temperature remained normal; tumor larger, and feels very hard.

June 3. Injected thirty-five minims, divided between four locations, endeavoring to reach a new point at each time. No elevation of temperature; tumor increasing in size.

June 6. Injected forty minims as before. Temperature normal; no unpleasant symptoms; appetite good. Pain in the region of the temporo-maxillary articulation and sense of fullness following the injection. Skin over the tumor is tinged slightly purple. Tumor about the same size, perhaps a little larger, and very hard.

June 8. Injected forty minims, as before. Pain quite severe after the injection, evidently from the pressure of the solution; this gradually subsided in half an hour. No abnormal temperature or other constitutional symptoms had been manifested.

June 10. Tumor seems to be somewhat smaller. Injected forty minims. Decided to double the intervals between the injections, as the tumor seems to be thoroughly dyed, and watch the results. Skin over tumor quite purple.

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* A full report of the operative procedures in this case will be found in the DENTAL COSMOS for September, 1891, page 764.—ED. DENTAL COSMOS.

June 14. Tumor has been slowly but certainly decreasing in size since the last date, and has softened very considerably. Injected sixty minims, divided among six different points. Pain quite severe for a few minutes after the injection.

June 17. Slight redness at upper part of tumor ; looks as though the skin was about to rupture ; fluctuation quite perceptible at this point. Painted this location with collodion. Injected sixty minims in lower part of neoplasm, which caused considerable pain for a little time. Tumor slowly decreasing in size, most noticeable at upper part.

June 19. Tumor ruptured upon the inner side into the mouth, discharging a considerable quantity of dirty-looking purplish fluid, evidently necrotic broken-down tissue stained with pyoktanin. Tumor soft and much smaller. No injection.

June 21. No injection. Tumor soft and greatly reduced in size, and discharging same dirty-looking fluid. No evidence of suppuration.

June 26. Neoplasm still decreasing in size ; discharge has ceased. Patient feels so much better that he desires to return to business. Small point of coarse granulations near the anterior border of the velum palati. Injected thirty minims in this location.

July 1. Neoplasm has nearly disappeared, and the patient has gone back to his business. The coarse granulations referred to have disappeared ; they were doubtless due to irritation from the packing used to close the cavity into the nose.

July 13. Patient reported to-day for examination. Neoplasm has entirely disappeared. Discovered another point of coarse granular-looking tissue at the bottom of the cavity ; applied pyoktanin 1 to 300 of lanoline upon a piece of absorbent cotton held in place by the packing above referred to.

July 16. The coarse granular tissue at bottom of cavity has disappeared. Patient cautioned not to irritate the surface of the cavity by undue pressure of the packing, and instructed to report at once if at any time there should be evidence of recurrence.

Remarks.—In the exhibition of the drug in this case, I endeavored to profit by the experience contained in the published reports of others. From the fact that in all the cases reported by Dr. Meyer the drug was not borne well by the stomach, I refrained from administering it in this manner ; and as there was no external ulcerated surface, the use of stick or powdered pyoktanin was not indicated. I chose the 1 to 500 in 0.6 per cent. sodium chloride solution as being the safer strength, beginning the injections with twenty minims and gradually increasing them to one drachm for the same reason. The possibility of septic infection was guarded against by strict antiseptic precautions, and the needle wounds were covered each time with collodion.

From the beginning to the end of the treatment there has not been the slightest evidence of constitutional disturbance from the use of the drug, save the elevation of one degree of temperature, which occurred on the day following the first injection, and which I am quite inclined to believe was the result of anxiety as to the outcome of the treatment, rather than to the influence of the drug. Pyoktanin in this case has certainly proved very beneficial, and gives promise of establishing a complete cure. Time only will demonstrate whether this promise is to be fully realized.

One thought further: The impression has been gradually growing in the minds of not a few noted surgeons both of Europe and America that the clinical facts surrounding the location and progress of primary carcinoma and possibly sarcoma in all their forms would indicate an entirely local origin of these neoplasms, and that they might be caused by the lodgment or ingress of a specific micro-organism, entering through abraded surfaces and wounds. I therefore ask, May not the results so far obtained in the use of this powerful but innocuous antiseptic drug, pyoktanin, upon malignant neoplasms, be a further indication that this may be the correct theory of the origin of these growths, and the line upon which further experimentation will give the greatest hope of success?

If pyoktanin does not prove to be permanently efficacious, may we not hope that through the combined efforts of the chemist and the bacteriologist some other drug will yet be discovered that will eventually conquer this dreadful and loathsome scourge of humanity?

A PLEA FOR CONSERVATISM.

BY W. C. BARRETT, M.D., D.D.S., BUFFALO, N. Y.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 5, 1891.)

THERE are few men who possess minds so evenly balanced that they are enabled to view a subject from all the different stand-points, and, taking into consideration every factor that enters into the sum of the whole, deduce therefrom a fair and judicial estimate of the relative importance of each. One individual element assumes so close a relation to us that we see nothing else. A single angle presents itself to the vision, and gets so near as completely to shut out all view of other proportions, just as a finger's-end may be so close to the eye as to eclipse the whole world beside. This is especially true in all branches of medicine. There are such an infinite number of elements entering into the problem of pathological disturbances, each of which must in turn be taken up singly and carefully examined, that there is little wonder that every new agent presented should absorb attention for the time being, and monopolize a mind not sufficiently capacious to entertain more than one idea at a time. One single part of a great whole becomes so exaggerated by exclusive consideration that it engrosses the whole field, and everything else is lost to sight. Thus, one afflicted with some obscure disease may apply in succession to all the medical specialists, and in turn be told that the source of his illness is in the lungs, the throat, the stomach, the nerves, the genitalia, the eyes, or the teeth. And the opinion will in each case be an honest one, for constant contemplation of one organ, or set of organs, by the specialist has so exaggerated its importance that, remotely or immediately, each finds it connected with the physical aberration constituting his field of study.

When chemistry emerged from the dark ages of catalysis and spontaneous transmutation or change, and when was first observed what should have been known at the outset, that every chemical transition was the direct result of a definite active cause; when man obtained his initial glimpse into that wonderful microscopic world which so greatly transcends the macroscopic in extent and interest; when he began to comprehend the molecular disturbances wrought through the proliferation of the vegetable fungi, and to get a little inkling of what was the true nature of those previously mysterious processes called fermentation and putrefaction, if he were the enthusiast that discoverers usually are, he imagined that the whole arcana of nature were now laid bare. Here was a new world of unknown vastness, and the influence of it upon the organic bodies of which its denizens were parasites was as yet unlimited by actual discovery, and imagination ran riot in the possibilities. These minute organisms might be the so-long-hidden cause of the unknown. Here might be found the key that would unlock the mysteries of nature. The cosmic egg was hatched. Microbes managed matter; bacteria dominated disease, and pathology was but another name for a ferment. Corns and consumption were alike due to some specific micro-organism. The whole duty of man, professionally, was to get at the microbe and to destroy him, and then hermetically to seal up the tissues against further infection. Everything else was lost to sight by many of the so-called progressive physicians, and septicism and antiseptics alone ruled the hour.

In medicine the errors into which an unrestrained enthusiasm led such great men as Koch and Lister, and even Pasteur himself, have brought about something of a reaction, and it has been learned that every other study cannot be abandoned for the bacteriological laboratory, great and important as that department is. In dentistry we are slowly approaching the same point. It was with difficulty that the great and sublime truths of which Miller first gave us a clear conception secured fair consideration. I well remember, and so will some of you, when in 1884, only seven years ago, this association met in this very place, and when upon this floor I attempted to urge some of his views, I, with my friend Daboll, was fairly hooted down. We were howled at, and the wicked did gnash their teeth at us. Every time I opened my mouth one prominent member stopped it by hoarsely bawling, "I call the gentleman to order." But truth has made its way, and now the trouble is that the pendulum has swung to the opposite extremity, and upon this same floor I feel myself compelled to enter a protest against what has assumed the proportions of a craze. The microbe haunts us, and infinitely small though it be, it is large enough to eclipse every other factor. We are now as obscure in the clouds as we were before in the caves. Climbing out of the cellar of ignorance, we have not stopped at the first floor of reason, but have rushed into the garret of fanaticism and zealotry.

Let me not be misapprehended. I am not underrating the importance of a thorough study of microscopical biology, nor would I for a moment depreciate the influence of microbes in oral pathological conditions. But I do deprecate the idea that there is nothing else to be considered, and that antiseptics and germicides are the only remedies which our pharmacopœias should contain. I protest against the assumption that because Miller, as the result of his scientific investigations, proves that there is no special remedy that will insure an entire aseptic condition of the oral cavity, and that tooth-decay cannot be entirely prevented, that therefore all the splendid results of his years of investigation are barren and useless.

In a late journal a dentist insists that nothing has been gained in the last decade, because teeth still need to be filled, and alveolar abscess yet occasionally occurs. Look back, you gentlemen who have kept pace with the onward march of progress,—look back and see what was the condition of dental pathological knowledge in 1881. Have we no reason to feel encouraged? Are we not now to a greater extent the masters of disease? Does not the dentist who carefully and discriminatingly uses the knowledge of to-day, adding to it the nice manipulation upon which the practitioner of ten years ago depended,—does he not succeed the better for it?

The great trouble is that many men cannot imbibe a single draught of knowledge without becoming craniologically intoxicated. A single large idea overstimulates their intelligence, and they lose mental balance. There is something more than mere metrical jingle in the famous stanza from Pope,—

"A little learning is a dangerous thing;
Drink deep, or taste not the Pierian spring;
There shallow draughts intoxicate the brain,
And drinking largely sobers us again."

Intelligent and enthusiastic dentists, who have the ear of the profession, have discoursed learnedly upon microbes and ferments, upon germicides and detergents, upon coagulants and non-coagulants, while the younger men who were perhaps taking their first sip of the fascinating draught, or at least with less of experience and knowledge, listened with open ears and wondering eyes. Nothing was said of other conditions than that of septicism, because the speaker took it for granted that all were as well informed as himself, and that they would add the modifying provisions. A single factor seemed to be raised to a dominating position, and remedies new even to the chemist were specifically recommended, without a fair comprehension of their properties. Is it any wonder that in following such teaching mortifying failures resulted?

How long is it since immediate root-filling was a kind of craze, the result of just such enthusiastic but injudicious teaching? A new idea was allowed to run away with judgment. Theoretically, all that was necessary was depuration and sterilization. Young men ran off from the meetings, like newly-hatched chicks with half the shell upon their backs, and essayed the new practice until sad experience taught them that there were other elements to be considered, and that the dental millennium had not yet arrived. Some of them have sat in sackcloth and ashes ever since, giving dental societies a wide berth, and anathematizing these whom they believe to be false teachers, blind leaders of the blind, and all in the ditch together.

It seems to me time that we began to consider the subject of antiseptic dental treatment from a more rational stand-point. Microbes cannot be utterly excluded from the mouth. They will penetrate cavities of decay despite the greatest precautions. Absolute asepticism in any portion of the human economy is a dream that has no foundation in fact. At the International Medical Congress in London, in 1881, Sir Joseph Lister, who has given his name to a method of operative procedure, announced that the horrors of surgical interference were abolished, and that by means of the carbolic spray it was possible to operate under entirely aseptic conditions. But Ziegler, and Bantock, and Tait secured even greater success than did Lister, and they spurned his spray, being only sedulously careful as to cleanliness and irrigation. At the Congress held in Berlin last summer, we who had listened to Professor Lister with so much suppressed emotion only nine years before were astounded to hear him now say, "As regards the spray, I feel ashamed that I should ever have recommended it for the purpose of destroying the microbes of the air."

The practice recommended by some of our most intelligent dentists in the treatment of root-canals, it seems to me, looks toward the entire exclusion of microbes. Everything is managed with this end in view. The utmost stress is laid upon the most minute particulars, while other needed precautions are neglected. In cases of alveolar abscess we hear of nothing save detergents and antiseptics. It seems to be taken for granted that if microbes can be exterminated, nothing else need be done. In the capping of exposed pulps asepticism is made the only condition of success.

I wish again to say that I am not urging indifference to antiseptic treatment. I believe it to be absolutely essential to successful practice. But I do not think that it is the sole factor, and the only thing to be looked after. I do not believe that the entire absence of all organisms can ever be assured. I do not hold it possible to secure complete aseptic conditions by any external means or agents. We cannot control the processes of nature ; we can only influence them to a certain degree. We cannot, for instance, furnish the proximate principles of the body from without. We can only supply the proper pabulum, and from that allow the nutritive system to select and prepare its own material. The attempt to harden the bones or the teeth by giving phosphate of lime is a hopeless task, because it is not in accordance with physiological law, and it is quite as absurd to undertake the extermination from the tissues and organs of the body of all the micro-organisms, whether of a pathogenic or non-pathogenic nature. The oral cavity is never without microbes of various kinds.

The multiplication of remedies, and the duplication and reduplication of methods, will not compass the impossible. The more complicated the processes employed, the greater the opportunities for error. The absolute sterilization of dental instruments is impracticable. We may approximate it, but it is hopeless to attempt to destroy all spores without ruining the instrument. The germs of different fungi are too numerous and too widely diffused to be entirely eluded. Wherever air enters, there goes the possibility of infection, and air cannot be utterly excluded. Within the tissues, diffused throughout the blood, penetrating everywhere, the spores of the fungi are found, in health as well as in disease. There is no immunity from infection when an organ or a tissue shall have taken on a condition of atony. Man may fly to the uttermost parts of the earth, but there shall he meet with the destruction that wasteth at noonday. The microbe hath all lands for his own, and it is useless to attempt to escape his presence.

Does this absolve us from all attempts at asepticism ? By no means. The very fact of the universality of the microbe should stimulate us to greater precautions. That instruments may not be made absolutely sterile, is no excuse for the almost universal and criminal neglect of proper precautions. How many operators keep a sterilizing apparatus and faithfully use it ? It is of no material use merely to dip a point into some solution and then call it sterilized. How many have a special apparatus for the purpose? And yet no man should be permitted to practice without something of the kind. While we cannot utterly banish micro-organisms, we have no right to be inoculating with specific pathogenic bacteria. I have seen many cases in which a previously healthy mouth became diseased after the filling of a tooth by some careless or ignorant dentist. I have under treatment now a very bad case of localized stomatitis, the result of the lack of proper and decent care on the part of a dentist. A beautiful and refined young lady was undoubtedly inoculated from unsterilized instruments that had been used in an affected mouth. We never know how susceptible an apparently healthy patient may be to infection by some pathogenic organism. Even animals, not domesticated, may have such a condition of atony as to subject them to the action of microbes from which it is usually supposed that they have immunity. I have the skull of an old male gorilla which had a very bad alveolar abscess, the result of caries of the teeth, and I have another skull of a female gorilla that suffered from undoubted pyorrhea. I also have a case of exaggerated antral abscess in a gorilla. You know that this animal has never yet been kept in a state of captivity.

In a condition of entire health nature has made provision for the destruction of invading bacteria. Whether the theories of Metschnikoff be true, and the peculiar power to digest and devour them rests in the leucocytes of the blood, or whether microbicidic action may be found in some other function, we cannot now positively say. But we do know that until the tone of the system be in some way depressed, there is immunity from the usual pathogenic organism. That the spores of different ferments vary in virulence is of course a fact, but that does not affect the truth of the principle.

A tooth that has lost its pulp cannot be said to be in a normal condition. Yet in the healthy mouth, if proper precautions have been taken and if the right mechanical measures for its protection shall have been employed, we know that it is secure against the attack of disease under ordinary circumstances. We know that in many instances a pulp has been destroyed in the most slovenly way imaginable, without any regard even for decent cleanliness, a filling has been inserted over the devitalized pulp without even an attempt to remove the contents of the root-canal, and it has remained in an apparently good condition for years. We know that until within a comparatively short time the roots of teeth were filled without antiseptic precautions, because the condition was not then comprehended, and yet they were sometimes well saved. Westcott, and Dwinelle, and their compeers filled nerve-canals before microbes and antiseptics were dreamed of, and they did it with success, too. Antiseptic treatment is not then always an essential. But Westcott and Dwinelle were not able to save as large a number of cases, nor were they, with the incomplete comprehension of pathology which belonged to the fifth and sixth decades of the century, warranted in attempting the salvation of a class of teeth which, in the light of the further knowledge of this tenth decade, we do not hesitate to fill.

Thirty years ago there were very few who attempted the filling of root-canals, for the men who were able to make delicate manipulation take the place of pathological knowledge were limited in number. Now almost every dentist who reads the journals attempts root treatment, depending upon and following the methods laid down by those who pose as teachers. And it is just at this point that I desire to enter my protest against the half-teaching of the journals and societies when, affecting to discuss the whole of a given subject, only a single aspect of it is considered, and that is elevated into a matter of supreme, sole importance. I do not believe that it is sufficient that the cavity of decay should be deluged with detergents, saturated with germicides, and soaked with antiseptics. It is not enough that saliva should be excluded because of danger from infection. There are other reasons for it. The operation must be skillfully performed in yet another sense, and the manipulation must be perfect. The tissues about the tooth must not be injured by mangling blunders, any more than that they should be removed as far as possible from danger of septic infection. The filling should be judiciously chosen and properly inserted. The appropriate remedies to insure the restoration of the tissues should be employed. No use of germicides can atone for the lack of these and other manipulative measures. While septic conditions should be carefully looked after, even greater stress should be placed on hygienic and restorative measures, remembering that it is only in a state of comparative health that there is any security for the permanence of the aseptic condition.

I care little for coagulants or non-coagulants. Coagulation is certain in albumen when exposed to external agencies, and all the non-coagulants in the world cannot prevent it, except by its practical destruction. I care not to exclude all organisms, for I know that to be impossible. There are many which are not pathogenic in their character. It is idle to talk of danger from anaërobic, deep-seated organisms, for they are usually harmless, and if they were not they cannot be avoided. I care not that every instrument that enters the pulp-chamber shall have been heated to a red heat, which is the only way completely to secure sterilization. We know that the material with which the root is filled is never made sterile, and if the manipulation is what it should be there is no necessity for it. We know that complete asepticism of the mouth is a hopeless dream, even if it were desirable. But we also know that cleanliness and dryness are essential, and we know that these are within the reach of every careful operator. We know, too, that comparative freedom from pathogenic microbes is readily attainable, and the dentist who does not secure this is unworthy the name. We know that a state of asepticism is not the only one upon which health of the tissues depends, and it is quite as inexcusable to neglect one necessary precaution as another. So I again protest against the tone of some of our modern teaching, that seems to ignore all that is not new and unheard of by the average dentist, and that affects only the obscure and the occult. I am willing to sacrifice my reputation for scholarship to that of good sense. I would rather have the approval of those who are really intelligent, than the applause of any number of groundlings. If I can be known as a safe, reliable, conservative, level-headed practitioner, I will resign all claims to daring, experimental, brilliant empiricism. I recognize the fact that it is necessary that there should be innovations and innovators, but I do not desire to be the patient of one. I honor those who by patient, laborious investigation elucidate the incontestable truths of science, but I cannot give my approbation to him who catches up the half of an idea, and by an absurd extravagance manages to taint even the best cause. Therefore, while I eagerly seize upon new truths, I try to prove all things, and especially to hold fast to that which is good.

PHYSIOLOGICAL ACTION OF OBTUNDENTS.

BY L. E. CUSTER, D.D.S., DAYTON, OHIO.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 4, 1891.)

THIS paper has been written with a view to making clear and harmonizing a few conflicting ideas regarding the action of obtundents of the sensitiveness of the dentinal fibril.

Owing to conflicting theories, it will be fair to assume that this tissue whose sensibility we desire to obtund is of the nature of simple protoplasm, with, in this instance, an exalted sensitive function. It contains albumen, and this is therefore coagulable ; it is made up largely of water, and may be desiccated ; it is incased in a tube, and when it does not entirely fill this tube a fluid fills the remaining space. This fluid may be removed, and the temperature of the fibril may be reduced. These are the conditions upon which we are to work.

The dentinal fibril does not possess a blood circulation, and on that account the nutritive movements are slow ; so slow that any agent which produces local anesthesia in other parts in a few minutes will be very slow in acting to any depth in the dentinal fibril ; so slow, indeed, that we need hardly look in this direction for a practical agent. Cocaine as a typical representative of this class of agents has not been effective for this reason. Any agent which is to act upon the sensitive function of the dentinal fibril must be more powerful than cocaine ; it must not coagulate albumen ; it must have an affinity for water ; it must possess a penetrating property, and insinuate itself into the tubule, for it will not be carried in by circulation and but very slowly by any nutritive movement. Until we find an agent possessing these qualities, we need not expect to obtund sensitive dentine by suspending the fibril's irritability.

The most satisfactory results have been obtained in other directions. The dentinal fibril has a definite composition. The elements of all the proteids are in a definite proportion, and we have reason to believe that the proportion is very delicately balanced. If the structure of the fibril be changed, its irritability ceases and it can no longer communicate sensation.

The change of structure most easily accomplished is the coagulation of its albumen and the withdrawal of its water. If the albumen is coagulated, it is as effectual in checking neural movement as though the albuminous ingredient had been withdrawn ; indeed, the coagulation of albumen itself renders it harder, and its presence would prevent any exhibition of life more readily than if it were removed.

The coagulation of albumen, unless produced by heat, is somewhat self-limiting, so that since heat of 160° F. is not allowable for sensitive dentine, the action of present known coagulants is not entirely satisfactory. Before coagulation can be a practical success, we must have an agent which penetrates to some depth.

Penetrating escharotics, such as arsenic and the like, since they burn the tissue beyond recovery and endanger the pulp, should not be considered.

The other method of changing the structure of the dentinal fibril is by the removal of the water. The water holds a twofold relation with the fibril,—that which is a constituent of the fibril itself, and that which fills any inequalities between the fibril and Neumann's sheath. One is a constituent, and the other a condition. The water which is a constituent is always present ; it is always found where life and motion occur ; it is always a necessary condition for neural activity ; it makes up three-fourths of the entire body and about ninety per cent. of the dentinal fibril. Constituting such a large proportion of the fibril, it is evident that there would be a proportionate change in the structure and physical character if the water were removed. The size would be decreased, the albumen if coagulated would become harder, and in this desiccated condition it would be practically dead, incapable of performing nutrition and function.

The water which fills any inequalities between the fibril and its investments may be accessory in the transmission of sensation. In this relation it may transmit vibrations to the fibril or even to the fibriloblast. One of the most delicate nerves of special sense, the auditory, receives its impressions through the endolymph in which its terminals float. So if the water surrounding the fibril should be removed, the fibril's transmitting power may be affected.

The watery contents of the tubule are withdrawn by evaporation and by bringing an agent in contact with it for which it has an affinity. Evaporation is produced by raising the temperature and subjecting to a current of air. This is practically accomplished by the repeated blasts from a hot-air syringe. The water surrounding the fibril is comparatively easily abstracted, but to loosen the molecular grip in the fibril itself requires more force. There are many agents which have an affinity for water, but not all are suitable for use in the cavity of a tooth. The agents most desirable for this purpose would be alcohol or glycerin. Alcohol possesses a property different from glycerin which makes it valuable : it is volatile. Water is taken up by the alcohol and evaporates with it. Of course the affinity is increased the nearer the alcohol is absolute.

The water is more thoroughly withdrawn when the two principles, affinity and evaporation, are employed together.

As compared with coagulation as a means of changing the structure, dehydration is more thoroughly accomplished with the present known methods, and hence the results are more satisfactory ; so much so that I suppose the majority of operators use dehydration almost entirely as a means of obtunding sensitive dentine.

If we use a combination of the two methods of change of structure,—desiccation followed by coagulation,—we will secure more profound results. As a proof of the truth of this statement, we have an agent which when used on sensitive dentine both withdraws the water and coagulates the albumen, and a more effective single medicament for sensitive dentine we have not. This stands alone and at the head of the list as a practical, efficient, and I may say safe agent as an obtundent. I refer to chloride of zinc,—not a fluid when its affinity for water has been satisfied, but a crystal which will deliquesce when placed in the cavity.

The last method by which the fibril's transmitting power may be lessened is by changing the temperature. This is of value as an obtundent of sensitive dentine on the same principle that it acts upon the soft tissues. As a condition for the perfect performance of nerve-function, there must be maintained a certain temperature which is normal to the organism. If that temperature is lowered, neural activity is lessened somewhat proportionate to the departure from normality, so that there may be a point reached where complete anesthesia is produced. Of all the obtundents of sensitive dentine, extreme cold is the most effective; not that it is any better than perfect coagulation or dehydration, but because the temperature of dentine may be reduced more thoroughly than the albumen may be coagulated or the water withdrawn in ordinary practice. This is because of the distance of the bulbous portion of the pulp from collateral circulation, there being no blood-circulation in the dentine, the ease with which the crown of the tooth may be isolated from surrounding sources of warmth, and also because we have refrigerating agents so simple and effective in their action that they may be made to act even beyond the necessities of the case.

The reduction of temperature is best accomplished by the use of volatile agents, such as sulphuric ether, chloride of methyl, rhigolene, or nitrous oxide.

It has been claimed for ether and nitrous oxide when used upon dentine that they act by abstracting the moisture. If we substitute the word *heat* for *moisture*, their action will be correctly stated. It is a mistake to attribute the action of the above agents to any water which they may withdraw, for these are cold-producing agents, and it is contrary to the laws of physics to produce evaporation by lowering the temperature; so that water cannot be withdrawn by these agents unless there is an affinity, which with ether there is none, and with nitrous oxide the temperature is lowered so rapidly that the water is frozen before any quantity could be removed by affinity. Any agent which reduces the temperature opposes evaporation or any chemical action upon the tubular contents. All such agents obtund sensitiveness in but one way, and that is by reducing the temperature.

It will be observed from the foregoing that the function of the fibril may be completely suspended by coagulating all its albumen, by withdrawing all its water, or by lowering its temperature to a certain point. But the entire coagulation of its albumen is practically impossible at present, the entire removal of its moisture almost impossible, and the reduction of temperature is the only one which acts to any desired depth. So theoretically, and it has been found practically, that, except arsenical preparations, refrigerating agents are the most effective obtundents of sensitive dentine allowable.

Recently there have been introduced three new methods having the same principle of action which are misleading. The thermal obtunder of Small, the Milton obtunder, and the Richmond obtunder are instruments and methods which use an elevation of temperature and the vapor of an alcohol or an essential oil, or a combination of these, upon the dentine. There is a silent claim in all these that there is a specific action of the vaporized agent upon the conductivity of the fibril, otherwise why use anything but the jet of hot air itself?

The effect of throwing a warm or hot blast upon a tooth is to heat it. By heating the dentine evaporation of its moisture takes place. The fibril dries up, and there is an outward movement as the water vaporizes and escapes from the tubule. No medicine can possibly enter the tubule during this time unless it has an affinity for water. When an oil or any agent which has no affinity for water is used in these methods, it will be apparent how utterly useless it is. Then the oil is not applied in its liquid state, but in a vapor. Is the vapor of the oil of cassia more powerful than the liquid form in preventing the development of micro-organisms? What virtue can possibly be attached to attenuation, that the liquid must be vaporized? Power lies in concentration. What effect can a vapor have upon the dentinal fibril if it simply fills the cavity of the tooth? In order to be effective it must condense and enter the tubule before it can come in contact with the fibril, and this cannot take place when it is applied with heat.

The application of a vaporized agent in a warm or hot blast is essentially one of *desiccation*. The heat is the only virtue in this unless the agent has an affinity for water, when it may aid in carrying off the water vapor. The vapor of alcohol is effective on this account, and I think those who have recommended the use of oils or any agent which has no affinity for water are laboring under a delusion.

Unfortunately, the agents which are most effective are most dangerous to the pulp, and in our selection of an agent for the case at hand this is to be borne in mind.

DISEASES OF THE ORAL MUCOUS MEMBRANE.

BY J. D. PATTERSON, D.D.S., KANSAS CITY, MO.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 5, 1891.)

SOME of the diseases of the oral mucous membrane, their pathology, and their effect upon the dental organs,—the teeth,—will be the points considered in this article.

It behooves the dental profession to take cognizance of the fact that this subject has been very much neglected, because its importance has been underrated. Until the agitation brought about by investigation of the disease called pyorrhea alveolaris, there had been little attention to diseases which were of the mucous membrane *per se*. Since then investigators, although laboring under misconceptions, have recognized more than they did the importance to the intelligent dental practitioner of a thorough knowledge of the etiology and pathology of these complaints.

Much is still undecided, and the diffusion of such knowledge as may be said to have become generally accepted goes on very slowly.

The inception of the irritation by which we have disease of the oral mucous membrane may be divided into classes. It may be accidental, constitutional, or hereditary. Investigation and observation compels the belief that the active causes are seldom hereditary; they are oftener acquired conditions, but very largely due to the accidental in their inception, hereditary or constitutional factors merely acting as predisposing conditions.

I desire in this article to especially call attention to some of these accidental causes. We find that they are very numerous. The irritation may be mechanical alone, may result from the invasion of micro-organisms, from lack of hygienic care, from disuse, from infection, or from functional disturbances without mechanical aid.

We will first consider the cause of disease in this membrane by an arrest or disturbance of its function. The dental profession have not given so much thought to this particular line of investigation as to the search after irritants found in calcareous irritation, to microbian theories, or constitutional conditions, and therefore, we believe, have signally failed to explain the etiology of certain symptoms often found in this membrane, especially in the early stages of pyorrhea, where no irritation, constitutional or active, could be found; the disease being established, passing through its different stages from irritation to suppuration and loss of tissue, and giving to the observer nothing of its etiology, except in theories unsupported by any clinical fact. Our purpose is to study this membrane and endeavor to point out where the obscure irritation arises.

In glancing at the anatomy of the oral mucous membrane, it may be briefly described as a layer of epithelium with a connective-tissue framework, and glands underneath supporting the epithelial layer, and provided with blood-vessels, lymphatics, and nerves. The glands are of the tubular character, and are imbedded in the connective-tissue framework. Their function is to produce mucus. In health, mucus of normal quantity and quality is constantly produced. It is of a transparent, watery color, diffused over the surface. It serves to keep the parts moist, pliable, and in a state of comfort, and protects from the irritating influence of external matters.

The epithelial layer is in a constant condition of growth of the deeper and desquamation of the superficial cells. Whatever interferes with and changes this normal and physiological condition and function in this membrane may overcome its power of resistance, and disease will result. The oral mucous membrane is especially liable to changes in temperature, which interfere with its health. The effect of lower temperature, often met with in external causes, will be found to be a chilling of this membrane, which contracts its epithelium until the mucous ducts are prevented from pouring out their secretion, and functional derangement is thus established. This is commonly termed "taking cold." Any marked deviation from the normal heat of the tissues, viz, 98° F., may result in morbid changes.

Heat-production is going on all over the body. When any of the tissues are subjected to cold, this heat-production is stopped and morbid action comes. In the mouth the contraction of the mucous membrane is the first step, accompanied by stoppage of the mucous secretion. Quickly succeeding this we have increased nutrition, an overproduction of the mucous secretion on account of increased blood-supply, which is the result of irritation from disturbed function; a slightly reddened tissue follows from the same cause, and an abundant effusion of serum escapes; the epithelium cells fall off more rapidly than under normal conditions. As the inflammation progresses, and stasis and the other classic signs of inflammation ensue, we see the mucous discharge rapidly becoming purulent, because so many unripe cells quickly become pus-cells. Micro-organisms now make their appearance, and assist in the advanced stages of the disease. This process soon extends below the epithelium, and the membrane, becoming infiltrated with depraved cell-elements, swells and thickens, the inflammatory products resulting in suppuration in convenient territory.

Let it be borne in mind that until the advanced stage in the conditions described, there is not of necessity any presence of pathogenic or non-pathogenic micro-organisms. The irritation in its inception has been simply through an arrest of function. Neither have there been of necessity any hereditary or constitutional favoring conditions, without which these results would not have been manifest. Favorable hereditary condition of tissue and constitutional environment are in these cases merely predisposing factors. In other diseases of the mucous membrane exhibiting similar symptoms it is not to be doubted that constitutional conditions and peculiar diatheses figure largely, and that under such conditions and with the presence of pathogenic micro-organisms the mucous membrane is involved even at the inception of disease; but there are greater factors which explain some symptoms without seeking in the field of bodily conditions, micro-organisms and mechanical irritation.

I pass now to another irritant of the oral mucous membrane, viz: the prevalent habit of "mouth-breathing." Leaving out of the question the change in the temperature of the mouth by this habit, we find that respired as well as inspired air rapidly dries the surface of the mucous membranes, destroying the moistened lubricating surface, stopping the mucous ducts until the same train of symptoms from disturbed function already described is established. When a subject presents who from one cause or another breathes through the mouth, the intelligent operator can certainly predict the condition of the oral mucous membrane. It will be found in some of the varied stages of inflammation, acute or chronic, modified in extent by the degree of hygienic care bestowed by the patient.

Here we have again a numerous class of cases where undeniably the disease has arisen from the simple drying of the naturally moist, lubricated surface by the introduction of an atmosphere which is not normal to the tissue. No micro-organisms need be present, nor has calcareous or other irritant matter or bodily predisposition anything to do with the real inception of the baleful line of results.

The condition described as arising from interference with the function of the oral mucous membrane is not entirely and exclusively pathognomonic of irritation from mouth-breathing, or shock, or the result of thermal change. These symptoms may result from many different causes. They are seen in infection from catarrhal, croupous, diphtheritic, or tubercular surroundings. They are superinduced also by medicinal treatment, by mechanical irritants, and by uncleanliness.

In this last cause is found the etiology of by far the greatest number of diseases of the oral mucous membrane. We find, however, that while the cause of the described conditions may be varied, and while the cause will measurably affect the malignancy of the disease, yet the pathological symptoms are very similar, and we are brought in contact with a *condition* which follows from *numerous* active causes.

This *condition* is a disturbed function. A physiological protest arises, profuse discharges ensue, inflammatory processes are established, which end in suppuration. The same clinical aspects are found in the nasal tract, in the pharynx, and all connecting cavities of the upper air tract. The chief symptom is an abnormal secretion or discharge of mucus or muco-pus, and—I care not that objection has been made by some authors to the application of the term "catarrh" to a lesion in the oral cavity, yet—a catarrh it is, just as inevitably as any fact established in pathological conditions. I repeat, however, that catarrh is merely a condition or symptom, and is present in many differently-caused diseases affecting the oral cavity and the upper air tracts.

In the oral cavity the train of symptoms we have described meets with conditions which rapidly determine and further the inflammatory processes. The teeth are surrounded by mucous membrane, whose union with the teeth forms a somewhat abrupt break in its smoothness and continuity, affording a nidus for irritating matter to lodge and ferment. The gingival margins, it is well known, rapidly become the focal points of disease. At this margin, then, we find the most noticeable results of the loss of function in the mucous membrane. Through continued inflammatory action we soon have destruction of the normal union of the tissue to the tooth, and then ensues the train of pathological conditions so well known and often described as pyorrhea alveolaris; which is simply a stage in the disease naturally resulting on account of the peculiar anatomy of the region, a sequence of preceding pathological disturbances, easily traced, and in favorable conditions surely following.

In speaking of diseases of this mucous membrane of the mouth resulting in what is familiarly known as pyorrhea alveolaris, different authors have expressed themselves strongly opposed to the use of the term catarrhal in describing the clinical appearance. They take this position because they are laboring under an entire misconception in regard to the term. They consider catarrh a *special*, *peculiar* disease of certain membranes which ultimately leads to ulceration and necrosis, when it is *not this at all;* it is simply a *condition*,—a condition of discharge,—and not a disease of special cause or pathology.

Another somewhat prevalent idea entertained by the medical as well as the dental profession is, that there is a catarrhal *diathesis*, a peculiar systemic condition, under which a patient speedily becomes liable to catarrhal inflammation. In regard to this, the celebrated Dr. F. H. Bosworth says, "I know of no such condition, and there is no good ground for the assertion. My clinical experience also fails to justify the view in any manner" (p. 101, "Diseases of the Throat and Nose"). The fact is that the best clinical experience and observation of specialists in diseases of the mucous membrane agree that the conditions of the mucous membrane here described are, with few exceptions, of local origin; that the constitutional disturbance is only secondary, and that for the most part only local treatment is demanded.

Another argument against classifying these diseases of the oral mucous membrane as catarrhal comes from those who lay great stress upon climatic influence. They find in climates where catarrhs are almost unknown many cases of pyorrhea, and, on the contrary, where catarrhs are endemic find no increase in the number of those suffering from discharges from the oral mucous membrane.

In regard to this, I think it must be considered a very loose statement, for, in the first place, statistics in the premises gathered by those who have devoted their lives to the treatment of diseases of the mucous membrane prove that those diseases are not peculiar to any climate or country. It was formerly supposed that these diseases were more prevalent in America than in Europe, but this has been disproved. It was found that they had received more attention from specialists in America at an early date, and so catarrh was called an American disease. It has been found, however, that it is equally prevalent in Europe.

There can be no question that a change of climate works wonders in catarrhal troubles once they are established, "but that climatic influence is an important factor in its causation is open to question" (Bosworth). The highest authorities agree upon this point.

In leaving the question for your discussion, I suggest the following considerations:

1. That the inception of disease in the oral mucous membrane, where the cause is obscure, is often to be found in the arrest of function in that membrane by thermal shock, by "catching cold," or by mouth-breathing, by which the moist, lubricated membrane is destroyed, rather than by hereditary conditions, constitutional diathesis, or the invasion of micro-organisms.

2. That the irritated mucous membrane which we find weeping out an abnormal quantity of mucus or muco-pus is not pathognomonic of any special irritant, but is simply a condition.

3. That this condition is properly termed "catarrh."

4. That catarrh is not a special disease, but is merely a *condition* of disease.

5. That the name pyorrhea alveolaris simply denotes a stage in catarrh of the oral mucous membrane, is not pathognomonic, but may result from a great variety of causes.

VITREOUS FILLINGS.

BY WM. H. METCALF, D.D.S., NEW HAVEN, CONN.

(Read before the Connecticut Valley Dental Society, at Holyoke, Mass., June 10, 1891.)

ON the sixth of July, 1886, Dr. Wm. Herbst, of Bremen, Germany, first submitted to the dentists of America his method of introducing glass fillings into cavities in teeth. This was at a clinic at the S. S. White dental depot in New York City. Owing to its elaborateness, dentists did not at first seem to take a lively interest in this method, but since then Dr. Herbst has simplified and improved it to such an extent that it has claimed and is now attracting a great deal of attention.

He first took an impression of the cavity with wax, or impression material, into which he poured plaster to obtain a model of the tooth and cavity. Into this plaster cavity he put a mixture of white and brown powdered glass, previously pulverized under water in an agate mortar, each color separately, afterward mixing them to get the proper color and shade. After partly filling the cavity with the powdered glass, he placed the model in an iron thimble and burned it over a Bunsen gas flame, or an alcohol lamp, until the glass fused, adding a little glass at a time until the cavity was full, and watching carefully to see if the color was right. If too dark, he added a little white glass to the mother-mixture, and if too light a little of the brown, until the cavity was completely filled with the vitreous substance. This he took from the plaster and cemented into the cavity in the tooth with oxyphosphate cement.

Since that time (1886) the process of setting glass in teeth has been greatly improved and simplified, and chiefly by Dr. Herbst himself, to whom I think should be given the entire credit of the introduction of vitreous fillings in teeth. I am indebted to Dr. C. P. Schultz, of New York, for my knowledge of the history of the modifications and improvements which have since been made by Dr. Herbst. Dr. Schultz has spent much time with Dr. Herbst in Bremen, and was an eye-witness to some of these improvements. When he was in Bremen about three years ago, Dr. Herbst had already improved upon the method described. He at that time took two or three impressions of the cavity with impression compound, using old separating files, or bits of German silver, as carriers. These after being cooled in water were filled with a mixture of plaster of Paris and powdered pumice (two parts plaster to one of pumice), thus making several miniature casts representing a part of the tooth, with cavity in it. Into this cavity a few grains of clean white beach sand were thrown to secure a roughened surface for the cement, and over the sand a little powdered glass was sprinkled, which, after drying and heating, was subjected to the fusing process by means of a mouth blowpipe and Bunsen burner. Several impressions were taken because the glass sometimes cracked or was smoked.

His next advance was the using of gold foil in combination with impression compound in taking the impression, afterward fusing the glass in the gold foil, which remained imbedded in the plaster model. By the use of gold foil he noticed that the edges of his filling were cleaner and more sharply defined.

The next improvement consisted in taking the impression directly with heavy gold foil alone, thus dispensing with wax or impression material, and also with the plaster models, and this latter method is the one at present employed, and has been found unique and useful in certain localities of the teeth,—namely, the labial and buccal cavities of the anterior teeth, and occasionally in easily accessible approximal places where an impression is possible, and in cavities in isolated teeth.

Occasionally vitreous fillings are put into crown cavities in molars, but only where a strong tooth-substance is present, and where a heavy strong filling can be used. Common sense will generally dictate where these vitreous settings may be useful and often superior to gold.

I will now describe a few minor details of the process as used by myself in the manipulation of this kind of work, which are substantially the same as those employed by Dr. Herbst.

To get the colors I grind glass beads—white, yellow, amber, and blue—separately in an ordinary Wedgwood mortar. It is not necessary to grind under water if the mortar is covered by a cloth or towel to prevent the glass from flying out. When the colors have been ground fine, I mix them in different proportions until I get the standard colors for teeth, baking samples on gold foil, or in plaster molds.

I keep the colors in glass bottles, which I label and number to correspond with the S. S. White sample color teeth. I insert a sample baking of each color into the cork of its bottle. In this way I can easily and expeditiously get an approximate color for immediate use. Some of the amber and light-brown junk bottles are useful in getting suitable tooth colors, and I would especially recommend for a suitable yellow the bottle in which phénol-sodique is put up.

For example, take a labial cavity in an upper incisor, near or under the gingival border. After adjusting the rubber-dam, pin back the gum with a simple but most ingenious contrivance of Dr. Herbst, which is simply a needle bent twice at right angles, bayonetwise. Take an ordinary steel needle about three and one-half inches in length, and with pliers snap off the eye. Then draw the temper of the half nearest the blunt end over the flame of an alcohol lamp, and make two bends at right angles. This has served me better than any of the more complicated steel clamps made for the purpose of forcing and holding back the gum.

With the point of the needle push back the gum with the rubber-dam until the cavity is fully exposed, then force the point of the needle firmly into the cementum, and throw the upper edge of the rubber-dam over the blunt end of the needle, thus holding it securely in place. The gum is effectually pinned back. Prepare the cavity for filling as for gold, in the usual way, but make no bevels or undercuts. Next take an impression with a bit of heavy gold foil, say Globe No. 60. It requires care not to split or tear the foil; so first crinkle it in the fingers, and then gently push it into the cavity with a wad of bibulous paper or cotton. Lift the gold out carefully with tweezers, and place it upon a net-work frame made of fine platinum wire.

Then selecting the color, put a little of the powdered glass into the gold matrix or impression, and fuse it over an alcohol flame, taking care not to melt the gold foil. Then carry a drop of water into the matrix with the point of an instrument, and add more glass, repeating this until completely full, watching after each baking to see by comparison with the tooth that the color is correct.

Before inserting the filling make a very slight undercut in the cavity to hold the cement firmly. Care will be necessary in carrying the filling to the tooth, but by waxing the end of a match and sticking the filling thereon it is safely and readily handled. Mix the cement to a creamy consistence, and, after placing enough in the cavity, push the filling into place. A little practice on teeth out of the mouth will soon give confidence and expertness, and enable one to insert a filling at once esthetic, durable, and artistic, and worthy to be classed among the best dental operations. I say durable because, although the art is comparatively new, fillings which have been in the mouth somewhat over two years are yet perfect.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.

THE thirty-first annual session of the American Dental Association was held in the Town Hall, Saratoga Springs, N. Y., commencing Tuesday, August 4, 1891. While not specially remarkable for large attendance, the meeting was notable for the great number of excellent papers which were presented, causing a pressure for time to hear them that precluded in many instances adequate discussion. Several of the papers were distinctly valuable contributions to dental literature, so that the sessions of 1891 may be regarded, from the literary standpoint at least, as among the most gratifying in the history of the association. The executive committee, also, under the efficient and experienced guidance of its chairman, Dr. J. N. Crouse, did its work promptly and thoroughly, contributing not a little to the successful outcome.

FIRST DAY—*Morning Session.*

The association was called to order at 11.10 o'clock, President Harlan in the chair.

Among the routine business was the adoption of an amendment to the constitution, striking out Sec. 2 of Art. VI, which permitted the officers, under certain circumstances, to change the time and place of meeting.

The committee on unification of state laws and the appointment of dentists to the army and navy reported through Dr. H. B. Noble, of Washington, that they had prepared an identical letter to the surgeons-general of the army and navy, urging the appointment of dental surgeons to the army and navy, and asking advice on the subject. The surgeon-general of the army replied that the matter had been considered on several occasions, but that the idea was deemed impracticable at present, especially in those sections where the army was distributed in small bodies over a vast territory; when the army was in camp in large masses, it was generally near some large city where the services of regular dentists were usually available; and there was not so much need of the services of the dentist even in distant portions of the country as there formerly was, because railroad facilities placed them always within reach of some growing city. No reply had been received from the surgeon-general of the navy. It did not appear that the project would meet with much encouragement from the medical men of the army and navy, and, if it was attempted to accomplish it through legislation by Congress, opposition was likely to be met. If carried, the position of dentist in either service would be such that it would likely be sought after only by the lazzaroni of the profession, and the result would not elevate dentistry in the eyes of the medical profession.

The subject of dental legislation is broad and deep, and it is not clear just what is the best plan to secure unity of action in the various states. Regarding the powers that should be granted to examining boards, and the question whether a diploma from a reputable dental college should exempt the holder from examination, the trouble seems to be as to who shall determine what is a reputable college. It seems but just and fair that a graduate should have some standing. As a rule, examining boards are not as well calculated to determine the competency of candidates as instructors or regular teachers. The difficulty might be overcome by a committee from the examining board in each state being present at the college examinations, and if the examination was satisfactory, the committee should indorse the diplomas, the holder of a diploma so indorsed to be exempt from any further examination. A national committee, selected from the National Examiners' Association, might perhaps be better if such a committee could be secured.

The proper education, elevation, and growth of the profession must come through the work of the colleges, and when this is well done they should be indorsed and encouraged by laws recognizing their work. When dental laws were first enacted, they did not contemplate the ignoring or supervision of diplomas from reputable dental colleges; but the rapid increase of schools and their competition for patronage soon brought doubt upon the thoroughness of the work of instruction in some, and thus arose the question as to the sufficiency of the possession of a college diploma as a test of fitness for practicing dentistry. It was believed by some that the proper way to correct this was by giving examining boards power to ignore all diplomas, and this has been done in several states, thus reducing the reputable diploma from a good college to the level of the poorest. Is it not better to seek to elevate and improve the colleges by recognizing their work when properly done, and to give them standing and recognition, making a diploma mean what it says? Have not the colleges furnished the men for society organization and work? Have not these societies been the parents of dental legislation and examining boards? College training is one of the foundation-stones of professional life. Another reason for making diplomas stand for something is that old practitioners and those who have passed a creditable examination by those qualified to conduct an examination might change their location if desirable without being subjected to an examination every time a state line is crossed. Some of our most skillful and scientific operators could not pass a strict, technical examination such as is required of the student for graduation. The necessity for the examination of a practitioner every time he changes his location would be avoided by the recognition of a diploma from a reputable college, and the character and reputation or standing of the college can best be ascertained by a national or state committee. It does not seem feasible to seek a national law, as each state would justly claim the right to construct its own laws, and great care should be taken that these shall be legal and just and not retroactive. Dental legislation has had perhaps too rapid growth, and a little pruning is desirable rather than stimulation of growth.

The report concluded with a recommendation that dentists ask their members of Congress and senators to give their attention to dental legislation for the District of Columbia.

The report was received and adopted.

The committee appointed last year to investigate the nature and status of the dental law of New Hampshire, with authority to take such action as in their discretion seemed proper, reported through their chairman, Dr. L. D. Shepard, that the statement made before the last meeting of the association that the dental law of New Hampshire passed in 1879 had been declared unconstitutional was correct; but that the statement was incorrect as to the reported appeal to the Supreme Court of the United States; that the dentists of New Hampshire had wisely accepted the decision of their own highest court, and had applied themselves successfully to the enactment of a new law which does not contain the unconstitutional provisions. The decision was based on the ground that the statute imposed the burden of a license fee upon certain persons, and exempted others of the same class and profession under similar circumstances and conditions.

The report was received and adopted.

Dr. J. Taft, Cincinnati, O., offered a resolution for the appointment of a permanent committee on necrology. The resolution was adopted, and the committee was afterward appointed, as follows: J. Taft, Louis Jack, G. W. McElhaney, Frank Abbott, and E. S. Talbot.

President Harlan, calling Vice-President Patterson to the chair, read his annual address, of which an abstract follows:

After a brief tribute to the memory of Drs. W. H. Atkinson, Edward Maynard, and James W. White, who had died within the year, the president proceeded to point out defects in the system of transacting the business of the association, offering suggestions for its betterment. He recommended the appointment of a committee to inquire into the working of the Sections, in order to secure greater efficiency and enlist the services of a larger corps of workers, so that the entire work of the Section should not, as it had too often in the past, fall upon the chairman. For the transaction of the purely business proceedings of the association he recommended the plan of an executive council, which should have entire charge of such matters, taking them out of the regular sessions, and so allowing more time for the consideration and discussion of scientific papers. He also called attention to the fact that meetings must under the constitution be held at a time of the year which makes it impossible to convene south of Mason and Dixon's line, and suggested that an amendment to the constitution permitting the members assembled at one meeting to name the time as well as the place of the next gathering, or delegating the matter to an executive council, would result in a large increase of membership by making it possible for the association to meet at seasons when it could go into a territory now practically barred.

As a further factor in increasing interest in the meetings of the American Dental Association, an effort should be made to see that state dental societies at least are organized in every state and territory where none are now in existence, and local societies in cities and towns of from twenty-five thousand to fifty thousand inhabitants and upward ; and where existing societies are weak numerically that they be stimulated by the appointment of boards of visitors to reawaken interest by assisting in providing attractive, useful programs for meetings. This is especially important in view of the action taken at the last meeting of this association, appointing with the Southern Dental Association a general executive committee for the purpose of organizing the World's Columbian dental meeting in Chicago in 1893. Such efforts will secure larger membership for local societies and increased interest in their work, and assure a cordial support of the project named. The general executive committee having the organization of this meeting in charge have not been idle, and various committees are now earnestly at work to make the gathering a splendid success. It only devolves upon the profession to give them cordial support and to afford them every facility to secure not only the best efforts of the best men in the production of papers, but to make a series of instructive clinics that shall astound the people of the world who will visit Chicago in 1893 at the progress of American dentists and American dental surgery.

In concluding, the address felicitated the association on the fact that, with the beginning of the coming fall sessions of the dental colleges, attendance upon a third year becomes obligatory to students of dentistry ; a departure which bids fair to become a permanent fixture.

The address was referred to a special committee of five, consisting of Drs. W. C. Barrett, Frank Abbott, James Truman, Thomas Fillebrown, and E. S. Talbot, to consider and report what action may be necessary to carry out the recommendations.

Adjourned to 8 o'clock P.M.

Evening Session.

The association met at 8.15 P.M., President Harlan in the chair.

Section VI, Physiology and Etiology, was called, and the chairman, Dr. H. A. Smith, Cincinnati, read a brief report, reciting the action of the Section under the resolution adopted last year authorizing them to procure a tabulation of the pre-historic crania in the collections in this country, and giving the titles of the papers to be offered by the Section.

Dr. Louis Ottofy, secretary of the Section, reported that the Section still continued its observation of the operation of implantation, and a conservative statement regarding it is that (1) in properly selected cases implantation is successful for a period of from three to five years ; (2) no other operation in dentistry equals in beauty, service, natural appearance, and perfect comfort a successfully implanted tooth ; (3) no disease has ever been transmitted by implantation ; (4) a combination of transplantation and implantation will often enable the dentist to make good use of an otherwise worthless socket of a tooth lost on account of calculus, pyorrhea, or other cause. The Section believes the profession is justified in performing the operation in suitable cases.

Dr. Eugene S. Talbot, Chicago, read a paper entitled "Mouth-Breathing not the Cause of Contracted Jaws and High Vaults."*

Dr. J. J. R. Patrick, Belleville, Ill., read a partial report of the work that had been done in the tabulating of pre-historic crania. [Many of the returns from the gentlemen having the work in charge in different cities had come to hand too late to be properly arranged in time for the meeting. The completed report had not been received up to the time of going to press.]

Dr. L. E. Custer, Dayton, O., read a paper on the "Physiological Action of Obtundents."†

Adjourned to 9 o'clock the following morning.

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*This paper, with the discussion which followed, will be printed in the DENTAL COSMOS for November.

†This paper will be found at page 839, current issue of the DENTAL COSMOS.

SECOND DAY—*Morning Session.*

The association was called to order at 9.40 A.M., President Harlan in the chair.

Dr. Corydon Palmer, Warren, O., was accorded the floor, and presented the association with an oil portrait of the late Dr. Atkinson. Dr. Palmer, in making the presentation, hoped the association would one day have a place where the portrait could be kept so as to be seen, and that when that day came this might be the beginning or nucleus of a gallery of our distinguished men. A unanimous vote of thanks was tendered to Dr. Palmer.

Dr. C. N. Peirce read a paper by Dr. Alton H. Thompson, of Topeka, Kan., entitled "The Dentition of the Felidæ," of which an abstract follows.

The dentition of the true cats presents an interesting subject on account of being a conspicuous example of a highly specialized dental organization. The carnivorous animals having become adapted through countless generations to an exclusive diet,—the flesh of other animals,—present forms peculiarly and specially adapted to such a diet. After quoting Tomes's description of the teeth of the Carnivora, the writer gives the general characters which indicate a pure flesh diet, as under-sized incisors, large, deeply implanted cuspids, wide diastema, reduction of the molar series, cutting-blades on the molars, etc., the true molars being so small as to be scarcely visible from the outside of the jaw. The lower first molar consists of a blade only, divided by a V-shaped notch. The first premolars are much reduced and often scarcely visible. The formula of the Felidæ is—

$$\mathrm{i}\,\frac{3}{3},\quad \mathrm{c}\,\frac{1}{1},\quad \mathrm{pm}\,\frac{3}{2},\quad \mathrm{m}\,\frac{1}{1} = 15.$$

Describing the action of the teeth, he says the blades of the molars pass each other like the blades of scissors, in express relation to the cutting of flesh. Vacancies permit the interlocking of the strong cuspids, which are formidable and efficient weapons for seizing living prey and lacerating and dividing flesh. The incisors are well adapted for scraping and gnawing bones, the sectorials for cutting flesh and dividing the resisting fibrous tissues, and the tubercles for cracking and crushing bones. The jaws are short, the muscles strong, and the articulation a mere hinge, so that it limits the jaw movements to the vertical alone. There is not much mastication or insalivation of food in this order, as the flesh food is readily digested. According to Cope, the successive modifications of forms which have resulted in the existing specialized lower sectorial tooth of the Felidæ consist in the gradual obliteration of the internal and posterior tubercles, and the enlargement of the external and anterior tubercles in connection with an additional anterior tubercle. The jaws have a shearing motion of the inferior against the superior teeth, quite distinct from the sub-horizontal movements of Ruminants or the vertical motion of hogs or monkeys, and exactly adapted to the cutting of cartilages and tough tissues by the shearing of the outer edge of the lower molars on the inner sides of the external tubercles of the superior teeth. The cusps of the teeth engaged in this process are developed in elevation at the expense of those not engaged,—the internal, the atrophy of which is not due to friction, but to disuse. The sectorial tooth is just in front of the masseter muscle, where the greatest amount of force is brought to bear upon it. The last molars are not modified into sectorial teeth in the modern Carnivora.

The mechanical genesis of the teeth in Carnivora is in accordance with its typal use. The passage from the archetype bunodont tooth to the scissor-like (carnassial) sectorial form is plainly exhibited by selecting a series leading from the lowest of both ancient and modern forms up to the Felidæ as the center of specialization. The tooth is developed in a vertical direction on account of vertical movement. The most highly specialized teeth in the Felidæ are therefore the sectorial premolars and the prehensile cuspids, which are characteristic, and place this family at the head of the Carnivora as the most highly specialized.

Dr. W. C. Barrett, Buffalo. It is not to our credit that such a paper should be passed by here without discussion. If the profession is to have any claim to be considered scientific, its members must study something else besides materials and appliances for filling teeth. That is professional; the preparation of such a paper as this is scientific work. Dr. Thompson has followed Huxley mainly, though in some respects he has adopted Owen's classification.

Most naturalists follow Cuvier, though some of his divisions are falling into decadence. The most commonly received division of the teeth in the diphyodont Mammalia is incisors, cuspids, premolars, and molars; Cuvier divided them into incisors, cuspids, false molars, carneous, and tubercular molars, which led to error. If one great archetype for the Mammalia were to be described, it would have, say forty-eight teeth, or perhaps fifty-two. To-day there are among the Ungulates animals which have forty-four teeth. If the archetype were forty-eight, the formula then would be—

$$\mathrm{i}\,\frac{3-3}{3-3},\ \mathrm{c}\,\frac{1-1}{1-1},\ \mathrm{pm}\,\frac{4-4}{4-4},\ \mathrm{m}\,\frac{4-4}{4-4}=48,$$

and it is not certain but that the incisors should be 4–4. In the Felidæ there is only one molar, the type having been modified by dropping those at the posterior portion of the jaw. Owen has made the last premolar a true molar, but it does not succeed a deciduous tooth.

How does it come that so many teeth have been lost from the posterior portion of the jaw and none from the anterior region? When did the diastema between the cuspid and first premolar arise? Most of those who have a right to speak on the subject say that these changes resulted because of the influence of selection of food; that the food being carneous and easily digested, requires less grinding, and therefore the unnecessary molars were lost. In endeavoring to solve the problem the old question at once arises, Which was first, the egg or the hen? We cannot say positively. The cuspids in the Canidæ are less modified than in the Felidæ, but there is no reason to suppose that the Felidæ preceded the Canidæ and their teeth are therefore still further modified. In the human dentition we have lost a molar, two premolars, and one incisor from each side, and the wisdom-tooth, or third molar, is now quite probably in process of suppression. That no teeth have been suppressed during the historical period of man counts for nothing, for a historical period is but as an instant in time. He has seen in the troglodyte gorilla a fourth molar. It was not a supernumerary tooth, but was perfectly developed. Sometimes, though rarely, the same phenomenon is seen in the human mouth. So that it would look as though there had been four molars in the human jaw at one time. Modifications are also seen in the incisors; sometimes the lateral is suppressed, and again a third incisor is found.

The true doctrine of evolution involves the necessity of change to suit environment. That the dentition of animals has been modified in number by the suppression of unnecessary or unused teeth, there can be no doubt. If the teeth can be modified in numbers, it is quite possible that their shapes have also been modified. The form of an organ does not always indicate its office.

The subject is a vast one, presenting at every step problems of deep interest to one who has any love for science. There is no other body of men more competent to undertake and carry out the elucidation of these problems than dentists, and if they are ever to be solved, the solution must come from them. We have been altogether too practical in the past. It is time to look beyond the mere manipulation of materials, to study principles. When they shall have been mastered, dentists will have earned the right to be considered scientific men.

Dr. C. N. Peirce, Philadelphia. When such a paper as this under consideration is read the query comes, Can we draw any lessons from it to apply to our specialty? We have learned that the Carnivora embrace three or four types, all flesh- or fish-eaters, all varying in their habitat, and in proportion as they vary in these things do the number of their teeth and the shapes of the head and jaws vary. Just in proportion as the diet and habits of the animal become specialized have the teeth been changed especially in accordance with the food-habits. There is no case known where the number of the teeth has been increased beyond the number of the ancestral type, but in every instance where the teeth have been modified and specialized they have been reduced in number. Forty-four is the typal number of teeth of the Mammalia. The modern thoroughbred horse has four rudimentary teeth, and only forty of full size. Whether the suppression of teeth is due to the influence of diet or of the nervous system by diversion of nutrition is not decided ; probably it is owing as much to one as to the other.

With reference to human teeth, man is omnivorous ; his teeth are therefore heterodont, and they are asking the question, Which way? Are we settling down to a specialization of food that can adapt the teeth to the needs of such a specialization? His own opinion is that man is in a state of transition, that the teeth are waiting to see which way the specialization will tend, and that until that can be determined there will be uncertainty in forms and number. We are now looking forward to the loss of four teeth,—the wisdom-teeth, or third molars. Thirty-two teeth is accounted the normal number, but only twenty-eight are found in thousands of cases. Among the Chinese, who subsist mainly on a rice diet, there is a marked modification of the cuspid type, arising from the disuse of meat food, and a marked increase in the incisors. These facts, if substantiated, indicate another alteration, due to specialization of diet, from that which has been so often noted with regard to the wisdom-teeth. Further investigation may show that the variations found in a limited field of observation among the Chinese are not true when applied to the race generally. Instead of suggesting that the human race will eventually become edentulous, these variations or changes rather point to the fact that when the specialization of food is completed man will have just the number of teeth required by his habitat. In this connection, the speaker's experience is that those persons who eat solid food and masticate it thoroughly, and those who eat their food dry instead of washing it down in a half-insalivated and half-masticated condition, have the least trouble with their teeth, and give the least trouble to the dentist to preserve them.

Dr. C. C. Carroll, Meadville, Pa. What Dr. Peirce has said about the Chinese, if further investigation shall confirm it, indicates that their teeth are being specialized for their special needs. If you give a nut to a gorilla, he puts it back in his mouth between the molars, and then brings the cuspids in apposition before he attempts to crack it. The point desired to be made is that the cuspids in man and in the higher anthropoid apes are not primarily for tearing food, but to serve as dowels to hold the jaws in position. In man or the monkey the office of these teeth is not the same as in the Carnivora, but they are there for the purpose of a dowel-pin or guide in the closure of the jaws.

Dr. James Truman, Philadelphia. Dr. Peirce says there are thousands of cases of absolute suppression of the wisdom-teeth. Where is his authority for that statement? Also, he says that the cuspids are the typical carnivorous teeth. The speaker has always been taught that the sectorials of the Carnivora are the typical teeth, as exemplified in the Felidæ and other carnivorous animals.

Dr. Peirce. The paper, following Cope and Allen, said that the cuspids and the sectorials are the typical teeth of the Carnivora. As to the loss of the wisdom-teeth, the statement was based on this fact. The speaker has had at least twenty cases of persons of adult years in his practice where the wisdom-tooth never has appeared and never will appear. From this fact he felt justified in saying that there are thousands of similar cases, and the plain inference is that the third molar is in process of disappearance from the dentition. There is another fact to be considered in this relation. If we go back to the animals which are supposed to be ancestral and closely allied to the human race, we shall find that there were originally thirty-six teeth, then thirty-four, then thirty-two, the typical dentition of to-day. Some of the monkeys have thirty-four teeth, some even thirty-six, and there is plenty of room in the jaws for all of them. Take the ancient races of men. They had thirty-two teeth, with plenty of room in the jaws, and the third molar, instead of being dwarfed as it usually is to-day when it does appear, was fully as large as the first. How are these changes to be accounted for, except on the theory of the gradual suppression of the tooth?

Dr. Truman. You say these teeth are suppressed because you do not find them in these cases. Suppose that an autopsy were held and the missing teeth were found in the jaws, would that be suppression?

Dr. Peirce. That would be suppression. It would show that there was not sufficient impulse to insure their eruption, that the vitality of the germ was by so much impaired. From its position the third molar is the perishable tooth of the series, when the change arises from such factors as the food specialization of to-day among civilized races.

Dr. Truman. What, then, is the meaning of the excessive development of the incisors of the vegetable feeders among the animals, as in the camel?

Dr. Peirce. It is the survival of the fittest from the ancestral type. With the camel these teeth become an organ of prehension.

Dr. Truman W. Brophy, Chicago, wished to know if he understood Dr. Peirce correctly, that the third molar was usually smaller than the others.

Dr. Peirce. Yes, almost always.

Dr. Brophy. Is it not a fact that it is sometimes longer and broader than the other molars?

Dr. Peirce. Occasionally it is, but it is very rare.

Dr. Brophy has observed that the superior lateral incisor is almost as frequently absent as the third molar, and on mentioning the fact to Dr. Black that gentleman agreed with his idea. The speaker is convinced that the lateral incisor has been suppressed absolutely in certain families. In one instance that he is familiar with, that tooth has been absent from the dentition for three generations.

Dr. Peirce. The difference between the wisdom-tooth and the lateral incisor is that a deficiency of the laterals in either parent is more likely to be transmitted to the offspring than a similar deficiency in the third molar.

Dr. W. H. Morgan, Nashville, Tenn. Dr. Peirce assumes that the teeth are lost because of disuse. How does this theory stand when it is confronted with the fact that while the superior lateral is sometimes wanting the inferior is not lost, and yet it is not so much used as the corresponding tooth in the upper maxillary?

Dr. Peirce. It is correct to say that the third molar is lost through generations of disuse, but that is not the cause of the loss of the lateral incisor. The suppression of the third molar is in the line of evolution from disuse; the other arises from some physical condition not clearly recognized.

Dr. M. L. Rhein, New York. Dr. Morgan has said what was uppermost in the speaker's mind as to the fact that disuse could not be said to operate in the case of the upper incisor. He has had for several years a theory to account for the loss of the superior laterals, which was suggested to him by two cases occurring close together, where the suppression could be distinctly traced to double harelip in the family. The deformity involves that portion of the jaw where the germs of the lateral teeth are or should be situated. He has had plenty of cases where there were no laterals, and sometimes not even the centrals, in families in which there had been harelip. It would seem natural that heredity would transmit a deformity so acquired.

The subject was passed.

Dr. J. D. Patterson, Kansas City, read a paper on the "Diseases of the Oral Mucous Membrane."*

Dr. H. A. Smith, Cincinnati, read a paper on "Phagocytosis."†

Dr. Rhein. Dr. Patterson's discussion of the forms of diseases of the oral mucous membrane and the methods by which they are brought about is very interesting, and no doubt cases such as he describes are frequently met with; but in all such cases the disease is bound to yield to proper treatment. They are simply localized expressions, and ought not to be difficult to cure. He has always thought that Dr. Patterson's view as to the amount and importance of constitutional disturbances in these diseases was not the proper one. From his view all forms of diseases of the mucous membrane ought to yield readily; but they do not, and we are forced to seek some other factor for their cause. The speaker takes exception to the statement in the paper as to the increased activity of the nutrition of the parts; he has found exactly the opposite condition, a decided stasis of the blood circulation. If Dr. Patterson is correct as to that portion of his claims, his conclusions are all right; but if he is wrong, the whole fabric falls to the ground. We find this class of diseases in all climates and times, and he believes, as does Dr. Patterson, that they are due to a perverted condition manifesting itself in the local lesions. It is difficult to argue on the matter without taking in both of the papers just read, and that of Dr. Smith's on "Phagocytosis" tends to bear out the speaker's argument. There is no question that excellent results did come from the violent treatment of pyorrhea alveolaris introduced by Dr. Riggs, in which the tooth is scraped clear to the root apex, and the reason is that it goes deep enough to reach all the tissues involved and sets up increased nutrient activity throughout the whole territory. It is time now that we had a better name for this condition. There are so many variations of disease, all called pyorrhea, that it is difficult to confine the name to the proper type. In his opinion, many cases are treated for pyorrhea where there has been merely death of the pulp, and the trouble has not been properly diagnosticated. He has lost in twelve years several cases where there were unsuspected dead pulps, and which because of some purulent discharge presented symptoms of pyorrhea.

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* See page 843, current number DENTAL COSMOS.

† See page 819, current number DENTAL COSMOS.

Dr. Barrett. This is a red-letter day for dentists and for the American Dental Association, when really scientific papers provoke scientific discussion instead of being passed in silence. The first of the two papers now under consideration is excellent, and he had nothing to say concerning its conclusions. In regard to the second paper, it has long been a problem among scientific men to determine the office of the leucocytes. It was not known what became of them, but the search has not been in vain. Last year at the International Medical Congress Lister receded from the ground he took nine years ago, and said that entire asepsis could not be secured so long as there was a possibility of the presence of bacteria in the blood. We know that the spores for the production of disease are constantly in the air, and that the system, although exposed to them, is not necessarily inoculated with disease. Why do they not produce their characteristic effects?

It must be because there is some means in the system by which it protects itself. It is now thought, though not yet absolutely proved, that this means of protection may be in the leucocytes. These have amœboid movements, and certain organisms have been seen in amœboid bodies, and the conclusion is that they are digested, as it has been positively ascertained that the amœboid cells have the power of digesting organisms of this sort by first enveloping them ; and it is supposed that when the blood is in the proper condition the leucocytes destroy the spores in this way. An experiment by Metschnikoff demonstrated the rapid proliferation of the spores, which as soon as the leucocytes obtained access to them were devoured. There may be a good deal of truth in the idea which the paper suggests.

Dr. J. E. Cravens, Indianapolis. If success has attended the operation of immediate root-filling, the phagocytes are welcome to their share of the credit. Some of the authorities, when immediate root-filling was first proposed, denied that it could be successful ; and now that they have found that it is successful, they want to take away the credit from the operator, and say that it is successful in spite of bad manipulation and because of the aid of the phagocytes.

Dr. G. F. Waters, Boston, was glad to see that the author of the first paper agreed with him in the idea that all inflamed conditions of the tissues arose from a disturbance of the nutrition of the parts involved. When a child is born, the surface of its body is, as it were, painted all over, and it requires some degree of cold and changes in the atmosphere to bleach it white, and in proportion to the thoroughness of the bleaching is the child healthy. If a child lives to go to school, a glance of the master's eye will send the blood coursing all through its body. What are the disturbing causes which act upon the skin, of which the mucous membrane is a part, as we find them today? Mainly mental (nervous) emotions ; sometimes atmospheric conditions. He had come to the conclusion that all diseased conditions arise from abnormalities in the circulation of the blood. Throughout all nature soda is associated with albumen in the blood, which when the proper balance is maintained is always alkaline ; when by disturbance of this balance the alkaline condition of the blood is destroyed we have these lesions, of the mucous membrane, or otherwise, according to the location of the manifestation.

Dr. L. C. Leroy, New York, wished to know if pyorrhea can affect devitalized teeth.

Dr. Rhein replied that some of the worst cases he had ever seen were connected with devitalized teeth.

Dr. Morgan. In pyorrhea alveolaris the disease extends wherever the periosteal covering of the hard tissues is destroyed. Sometimes the pulp still retains its vitality under these conditions.

Dr. J. Y. Crawford, Nashville, doubts if ever such a case develops after the nerve is destroyed. He has made pretty close observations, but has so far failed to find any such case. In one case he saw, an abscess had formed after the operator had failed to fill the canal approximately to the foramen, and this condition had been diagnosticated as pyorrhea alveolaris.

Dr. Patterson, in closing the discussion, said that he had never doubted that constitutional environment must be taken into the account in dealing with the diseases under consideration. His object in preparing the paper was to point out the incipiency of the disease, the starting-point of the trouble. Constitutional environment is a large factor and exerts a large influence after the disease is established. Dr. Rhein is mistaken in the view that stasis is one of the earlier features of the difficulty. At first, after the irritation is set up, there is increased nutrition to the part,—that is one of the classic signs of inflammation. Afterward we find the stasis of which he speaks.

Section VI was passed, and Section VII, Anatomy, Pathology, and Surgery, was called.

The chairman, Dr. Truman W. Brophy, read a brief report reciting the titles of the papers to be read from the Section.

Dr. W. C. Barrett, Buffalo, N. Y., read a paper entitled "A Plea for Conservatism."*

Adjourned to 7.30 P.M.

Evening Session.

The association met pursuant to adjournment, President Harlan in the chair.

On motion, Dr. J. N. Crouse, as chairman of the Dental Protective Association, was allowed five minutes in which to state the present status of the litigation with regard to crowns and bridges. He then related the result of the recent appeal to the Supreme Court of the United States, in which a decision was handed down declaring the two C. M. Richmond patents invalid.† The decision was unanimous. The Dental Protective Association has now assumed control of the defense in the suit brought against Dr. A. G. Bennett, of Flushing, L. I., which involves the validity of the Low patent.

The committee appointed last year at the request of the chairman of the Dental Protective Association to examine into the methods of that association reported through Dr. L. D. Shepard, of Boston, that they had examined the books and found the accounts were kept in a business-like manner, and that the affairs of the Dental Protective Association were managed economically; that the bills incurred had been paid, and that there is on hand, in cash deposited in bank and available notes, about $23,000. This amount excludes all doubtful assets.

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* See page 832, current issue DENTAL COSMOS.

† DENTAL COSMOS, June, 1891, page 490.

The report was adopted.

The committee on the president's address, through its chairman, Dr. Barrett, made a partial report, which was, after discussion, referred back to the committee to complete.

On motion of Dr. Northrop, Dr. George C. Daboll, of Paris, a former member of the association, who was present, was permitted, under the rules, to resume his membership.

Dr. Peirce, on request, related his experience with a patient who had the misfortune, owing to an accident, to swallow a rubber-dam clamp. As the clamp passed readily without complications to the stomach, the patient was put on a diet of mashed potatoes, and in a few days all interested were gratified and relieved by the recovery of the clamp, which had become completely encysted with the potatoes, and was passed without pain. The case was mentioned merely to remind all those who heard the recital, of this excellent resource in cases where foreign bodies are swallowed whose passage may from their conformation be likely to cause injury to the parts.

The discussion of Dr. Barrett's paper was passed, and Dr. John S. Marshall, Chicago, read a paper on "Pyoktanin Blue in the Treatment of Cancerous Growths."*

Adjourned to 9 A.M. to-morrow.

THIRD DAY—*Morning Session.*

The association was called to order at 10.45 A.M., President Harlan in the chair.

The paper by Dr. Marshall on Pyoktanin was declared open for discussion.

Dr. G. F. Waters had had an experience some years since in the relief of so-called cancer. There was a very offensive odor, and as the man had no physician he told him he could relieve the odor. Microscopical investigation of pus from the sore showed that it was undoubtedly an epithelial cancer. He introduced a few crystals of Calvert's carbolic acid into the opening, which was as large as the average thumb. The odor disappeared, but there was considerable pain. The next day there was not so much discharge, no odor, and the opening was larger, while the indurated surface was less. Matter was again sent to the microscopist, who reported that it came from bone cancer, although the tumor was not in contact with bone. At the end of three weeks, under the carbolic acid treatment, the induration had nearly disappeared and the opening was nearly closed up.

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*See page 824, current issue DENTAL COSMOS.

The man then was struck with a hemlock board, and the whole trouble became temporarily as bad as ever, but eventually the entire surface healed up and no discoloration of tissues was left. The speaker believes that cancer never occurs except when the blood is in a low condition of nutrition.

Dr. Truman. The name pyoktanin was given to the drug of which Dr. Marshall's paper treated by its discoverer, Stilling, because he supposed it to possess virtue as a pus-killer. It may be an excellent agent in general surgery, but in dental surgery it is liable to do injury because of its penetrative power, by means of which it may enter the dental structures and cause discoloration. He does not think it will prove of great value in dentistry as a bactericide. It stains rapidly whatever it is brought into contact with. The praise bestowed upon it by Dr. Atkinson, while possibly deserved when used in pus-pockets, is not warranted by experience of its employment in other directions. He regards it as of no more value for general use by dentists than any of the other coal-tar products. This coloring principle by which it stains the tissues, which is so far inseparable from its use, must always be objectionable.

Dr. George J. Friedrichs, New Orleans, wanted to know if Dr. Marshall attributed the cure in the case described solely to the use of the pyoktanin. It is well known that neoplasms are sometimes so exuberant in growth that when the nutrition stops they soften up, slough away, and cure themselves.

The discussion of the paper was passed.

Dr. J. D. Patterson read a paper describing a case of "Fracture of the Lower Maxilla by a Gunshot Wound,"* and its treatment.

The paper being open for discussion, Dr. Carroll said that in 1864 he had a case which was quite analogous to that related by Dr. Patterson. There were several fractures on both sides of the jaw, and the ball had carried away a portion of the maxilla and the teeth it contained, and also carried a portion under the tongue. When first seen, in February, 1864, the patient could not speak, and was suffering from phthisis pulmonalis. He dissected out the part under the tongue, but was unable to bring the parts together properly. He then took an impression and made a rubber splint, and opened at a point which was suppurating and found the suppuration was due to necrosed bone. For treatment of this he resorted to the use of aromatic sulphuric acid, and the suppuration stopped in forty-eight hours. The necrosed bone was removed, and he had the satisfaction of seeing the entire reproduction of the portion of the maxilla which had been destroyed, in four months. Up to that time he had believed that for the reproduction of bone the presence of the bone-covering or periosteum was necessary. In conclusion, he had only to add that the man is still alive.

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* See page 822, current issue DENTAL COSMOS.

Dr. Marshall is of the opinion that there will be no reproduction of bone in Dr. Patterson's patient, but it will be a beautiful case for the transplantation of bone, as the space to be filled up is small. By putting in little pieces, as thin as they can be cut and from a line to a line and a half long, the operation could probably be made successful, as the pieces would probably unite.

Dr. W. P. Horton, Cleveland, related the case of a man forty years of age and weighing probably one hundred and seventy pounds, who had fallen and broken his lower jaw in three places. The speaker was sent for by the surgeon in charge to drill holes in the bone for the insertion of sutures. Finding, on examination, that there was no break of the soft tissues inside the mouth, he advised that instead of applying the sutures as intended they should merely put on a plaster splint, which was done with the best results.

Dr. Patterson. It is not practicable to transplant bone in the case described in the paper, on account of the condition of the parts. The subject was discussed, but it was decided that it could not be done.

Dr. Brophy related a method for the radical closure of congenital cleft of the hard palate. As a rule, there is associated with the cleft in such cases harelip, either single or double, and the usual procedure is to close the lip and let the cleft of the palate go to be corrected in after-life with an obturator. He has long been opposed to this practice, and for several years had been endeavoring to devise a method of radical surgical procedure whereby the entire difficulty might be corrected at once. The best time for the performance of the operation is in early infancy, as soon as the organs of the body are performing their functions properly. Something more than external pressure is needed. Sayre uses pressure on both sides of the face, because the bones being soft may be compressed. However well this may do in cases where the cleft is narrow, it is impossible in broad clefts. The method which he proposes as a substitute is to first close the soft tissues in the usual way; then, paring the hard palate deep enough to get an exudate,—lifting the lips and cheeks anterior to the malar process,—pass with a drill through above the palatal plate; then, with a lead button and wires twisted together, he brings the pared parts together and holds them there. Three weeks is the preferred age for the operation. As to the effect which this operation will have on the germs of the teeth, he does not know; but one of the cases in which the operation was performed is so far advanced that we shall soon be able to tell. However, if the operation is successful so far as the cleft and its results are concerned, the loss of the teeth would be a small defect in comparison to that which was obviated.

Dr. Marshall. Wherein is this procedure better than the subperiosteal operation? Certainly it is more serious, especially as it is to be performed upon children so extremely young, when the risk of shock is so much greater than later on. It would seem better to defer operating until after dentition is completed and then perform the old operation. Under this proposed procedure the mortality must certainly be very great.

Dr. Patterson thought it was well settled that operations on the hard palate were to be discouraged, for the reason that you never can have enough soft tissue to bridge the cleft, and never can have perfect articulation. The operation proposed by Dr. Brophy does not in any way increase the quantity of soft tissue.

Dr. A. J. Volck, Baltimore, Md., at one time made a specialty of this department of practice, and has operated in many cases on both the hard and the soft palate. The operation for closure of cleft of the hard palate is a very serious matter in the case of children. He has seen two die under the operation from shock. Again, operations upon the hard palate are not successful and are not to be encouraged; with the soft palate it is another matter.

Dr. Marshall. With regard to closure of the soft palate, if the operation is properly done and there is enough of the soft tissues, there is no difficulty about the speech. One marked case he would mention: an Irishman, aged forty-nine years. In Boston one of the best mechanical men had endeavored to correct the difficulty of his speech by artificial means. The man finally drifted to Chicago. At the time he was first seen one could not understand a word he uttered either with or without the appliance. There was complete cleft of the hard and soft palates. He was operated upon, the soft tissues were slit at the sides and brought together, and the result was not only a very great improvement in his speech, but he could swallow without regurgitation.

Dr. Volck had never seen a successful operation in grown persons.

Dr. Brophy. As to the shock caused by operations upon extremely young children, it is not well established. He has had seventeen cases in five years, in three of which this operation was performed. There was no inflammation following, and the child seemed to thrive as well as anyone. As to the lack of soft tissue which has been spoken of, the child with cleft palate when born has as much as the perfect child, but there is no use for it under ordinary conditions, and following the law of nature it becomes atrophied, whence results the lack of soft tissue observed later on in these cases. It is a fact that if the cleft is closed in the very young infant there will be sufficient tissue to close the nares in articulation. The great difficulty in the old operation is that the parts are not sufficiently firmly brought together and kept in quiet contact, defects which the operation proposed is intended to overcome. If the case is permitted to go unrelieved by operation until later, the operation is a failure because of the atrophy spoken of. To have a successful outcome to an operation for cleft palate it is absolutely necessary that sufficient soft tissue be secured, and later in life this cannot be done. He is satisfied that there are many persons wearing appliances to-day for the amelioration of their speech who, had they been operated upon in the manner described early in life, would not need them. But in order to be successful it must be done before the teeth are in position. He has performed the old operation many times, but he regards it as inferior to the procedure which he is now advocating.

The subject was passed.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

CONSIDERING the attention given to social amenities at the annual meetings of the Southern Dental Association, the selection of Morehead City, N. C., as the scene of the twenty-third meeting was eminently fitting. What with fine fishing and still-water bathing right to hand, and a refreshing dip in the surf easily accessible at the end of a delightful sail of a half-hour or so, to say nothing of the hops at the hotel every evening, opportunities were not wanting for relaxation and recreation, nor were the members wanting in willingness to embrace them when the more serious duties which called them there permitted. To crown all these pleasures, an evening was given to a banquet tendered by the North Carolina Dental Association, at which there was the usual feast of reason and flow of soul, and the great dining-room rang with the eloquence of the speakers or echoed the rounds of applause with which they were greeted.

FIRST DAY—*Morning Session.*

The meeting was called to order at 10.50 A.M. by Dr. H. C. Herring, president of the North Carolina State Dental Association. Dr. V. E. Turner, chairman of the Committee of Arrangements, escorted the president of the Southern Dental Association, Dr. G. F. S. Wright, Columbia, S. C., to the chair to the accompaniment of music by the orchestra. After Rev. Dr. Stebbins had invoked a blessing on the proceedings, Dr. Turner introduced Dr. Herring, who in turn introduced Dr. J. F. Griffiths, of Salisbury, who in behalf of the dentists of North Carolina welcomed the members of the Southern Dental Association to the old North State. Dr. D. R. Stubblefield, of Nashville, Tenn., replied.

The association was then declared ready for business.

Dr. J. T. Calvert, Spartanburgh, S. C., presented the president, on behalf of his friends in the South Carolina State Dental Association, a handsomely-designed gavel, which was accepted.

The president read his address, in which he traced the history of the association from its organization, and referred to a project which was agitated for several years having in view the publication of a journal under the auspices of the association, but which was never consummated. He suggested that the proceedings of the present year be published in a single number of the *Southern Dental Journal*, and that a copy be mailed to each member in good standing ; the said number to contain the committees for next meeting, the code of ethics, the constitution, and the rules of order.

Thirty-seven colleges, claiming to be reputable, are now in operation ; of these, twelve were in existence in 1875, about which time the labors of chartered dental associations began to exercise a powerful influence on dental education. The colleges are to some extent the creation of dental associations, which have not only produced the college, but sustained it, by recommending it to the student and by securing the enactment of laws creating examining boards. Schools have multiplied, not always sustaining the best standard, and in consequence the associations have determined that through the examining boards the standard shall be maintained. This year the three-year course of study goes into effect, and 1893 promises, if the plan is adhered to by the colleges and sustained by the boards of examiners, to produce the real Doctor of Dental Surgery.

Last year the idea of a permanent home for the association was broached, an idea that ought to be carried into effect provided it shall not prevent our visiting other states or places when the good of dentistry or humanity demands it.

The constitutionality of dental legislation having been questioned, the address of Hon. J. L. Tribble, delivered before the South Carolina State Dental Association at its last meeting, will be interesting.

[The president then read Mr. Tribble's address, which, after recounting the reasons why dental legislation was necessary for the protection of the public from ignorance and charlatanry, proceeded to show that the legislature has the constitutional right to pass proper laws to that end as a police regulation. It must not provide cruel or unusual punishment, and it must bear alike upon all in the same circumstances. These are the constitutional limitations.

Mr. Tribble quoted decisions from the courts in several of the states sustaining the constitutionality of their dental laws. Speaking specially of the South Carolina law, he thought it ample in all respects, except that it provides only for a fine as punishment for offenders.

There should be an alternative punishment of imprisonment to make it more effective. Mr. Tribble referred also to another branch of dental law. The dentist, in common with members of every other profession, "undertakes to bring a fair and competent degree of skill" to the exercise of his duties, but he is not answerable for injuries arising from the want of the highest attainments. If he should perform an operation in a negligent manner and without a competent degree of skill, and injury to the health of the patient was the result of his negligence, he would be liable in damages. Concluding, he said, "No man familiar with the leading principles of the profession and having practical knowledge and ordinary skill in the uses of the instruments of his profession need hesitate to appear before a board of gentlemen for examination, provided he is an upright and honest man. He ought not to fall out with the law which requires him to show beforehand that he has the requisite knowledge and skill. This is the law, and it is the duty of every honest man to obey that law so long as it falls upon others alike in the same circumstances. It is the man who constantly violates the laws of his country who despises those laws, while the law-abiding citizen looks to those laws with pride and veneration for his protection, and he naturally looks with suspicion, and justly, too, upon him who tries to outrun or evade the law at every turn of the road."]

After the transaction of routine business, the association adjourned to 3.30 P.M.

Afternoon Session.

The association was called to order at 4 P.M., President Wright in the chair.

The Committee on Operative Dentistry was called, and Dr. E. L. Hunter, of Enfield, N. C., chairman, read a paper which he said was especially addressed to the younger practitioners. The grand ideas of operative dentistry are the prevention and arrest of decay in human teeth. Science has sifted and analyzed in vain for a preventive by the administration of "bone-making material," and we turn helplessly from the contemplation of "the cause" and address ourselves to results. Great good may be done by inducing better systemic conditions, but at present the duty is incumbent of saving an endless number of decayed teeth, not merely for the sake of the comfort, cleanliness, health, and beauty of the individual, but to answer the ends of that broader humanitarianism affecting posterity. How accomplish this? By filling, with a fair conception of the therapeutic conditions, past, present, and future, adding thereto such mechanical art as will answer the ends sought. The causes of decay may not be done away with, but the occasion can be removed, by leaving *indestructible points of contact*, with margins of tooth-substance entirely free from each other. In the application of this old but vital principle in tooth-saving, no matter what the material used, it may be necessary to carry the filling under the free margin of the gum, but this is objectionable as a rule of practice, and its application should be governed by the shape and texture of the teeth. In cases where from faulty nutrition it is difficult to prevent recurrence of decay, good results follow the use of both tin and amalgam to cover the cervical wall, the writer having never had occasion to remove such a filling because of stain or recurrence of decay; nor had he seen a case of failure of gold and amalgam fillings in the same when they were joined together. "Soft teeth" have borne the burden of so many sins that it would be difficult to decide whether they were a greater curse to the people than blessing to the dentist.

Although rather late in the history of dentistry to speak of Arthur spaces, the fact that they are often seen, bearing evidence of having recently been done, moves a protest against them as destructive to the teeth themselves and also as resulting in somewhat contracted arches, especially when made in young subjects. This lessening of the arch means the laying of all the flat-cut surfaces over against each other, with obvious results. Partial contour work,—that which does not by proper size and fullness prevent marginal contact,—while offering little opportunity for contraction, is sufficiently destructive, even when there has been an effort to do honest contour work, through an attempt at quick and consequent insufficient separation. Nowhere else, perhaps, is a competent dentist so completely handicapped as when working without abundant space. The writer preferred slow wedging to the use of separators, though in young subjects with crowns wide as compared to the necks, and where the teeth move easily, sufficient space could be gained with the separators. What he specially wished to recommend was space in which to see, to exercise skill in filling, and to finish properly. Space is the condition under which alone skill can be exercised; without it, skill becomes the merest bungling. He wished to impress the young men with the importance of subordinating all things to excellence. All things are open to abuse. Even the principal advantage of wide separation in operating—room to see and to make good adaptation to cavity walls, particularly margins—may be nullified by the adjustment of a matrix to make good wall adaptation difficult and margins of a properly-shaped cavity impossible. In amalgam filling the matrix permits better condensation in shorter time, but it does not do away with the need to shape the filling and trim the margins afterward. Near approach to artistic mechanical perfection proved the truth of the underlying principles in contour work, and only by the cultivation of art in conservative operative dentistry can we hope to establish principles. Thus, in nerve-capping or root-filling, given two operators with the same discrimination between disease and health and the same knowledge of therapeutics, what is possible to one is impossible to the other. We have an endless number of principles, methods, materials, and instruments, but our greatest need seems as much their conservative as skillful application. Take bridge-work, for instance. It did seem that bridge-work was to be commended where it was the least of two evils, but the tendency has been to apply it wherever possible, thus violating nature's laws and the soundest principles of dental science. "O tempora, O mores! When we had no choice, when it was a partial plate or nothing, we had to do—what we could do. Now, bridge-work ought at least to offer us a choice between two evils. Are we not to discriminate?"

Dr. J. Y. Crawford, Nashville, Tenn., agrees with the paper in the idea advanced against indiscriminately going up under the cervical wall in filling. Gold as a therapeutic agent is losing its value. Whether we accept this fact and put it to use in our practice or not, will measure our usefulness as dental practitioners; but it is a fact that gold is losing in therapeutical value in proportion as modern modes of living are creating greater need for therapeusis in the management of the teeth. Under present modes of living the teeth not only begin to decay earlier, but they continue to decay later than they originally did. In proportion as the physiological relations of living have changed has the course of tooth-decay become more rapid and more virulent, and just so do agents which are not therapeutical in themselves lose their value when applied to stop its ravages. Another point which ought to be received and acted upon by the dental profession is the thoroughness of our operations,—not merely in reference to the filling of individual cavities of decay, but with regard to the obliteration of decay from the oral cavity. We go to work and fill a few cavities, and think we have done it all. The filling of a tooth with gold and hermetically sealing the cavity of decay is the highest type of dental operations. What is needed is to do this and still maintain the therapeutic condition. We must harmonize our therapeutics and mechanics. We have accomplished a degree of skill that is beautiful to look at, and it is still more gratifying to see the results; but it is not all that is required.

One material was referred to in the paper which is next in its nefarious results to rubber. That material is amalgam. It will not do. In view of the evil which he believed that amalgam caused, he had said seven years ago that he believed crown- and bridge-work was the hope of modern dentistry, and he had lived to see the fact demonstrated. Amalgam, in his opinion, has done more harm than good in the aggregate. We must practice dentistry, if we are fit to practice it, in accordance with the best interests of the patient, not for the shekels. To get the best results for patients, as well as for ourselves, every sense of the whole five must be thoroughly trained so as to respond to everything brought before us. He hoped that this meeting would take up the matter, and thus do an amount of good never before accomplished. He hoped that crown- and bridge-work would be more thoroughly studied and its possibilities become more widely known. There is a warning in the paper that we may go too far in crown- and bridge-work. He does not believe that any man comprehends the extreme possibilities of crown- and bridge-work. Some have developed it to high degree, but its height and breadth and depth have never been sounded by any man. In his own mouth is a demonstration of its value in one direction. He has a tooth that was condemned as beyond redemption twenty-three years ago, and it has been sentenced more than twenty-three times since that time, but it is still doing excellent service through crown- and bridge-work. The advantage in this treatment is that it is often efficacious in saving teeth otherwise of no value, and it exerts a salutary influence on the other teeth. The operation of implantation he regards as morally and scientifically wrong, although it has even been used to provide an anchorage for bridge-work. It is robbing Peter to pay Paul, and it cannot be a success.

Dr. E. L. Hunter felt that he would be recreant to the trust confided to him if he did not defend the position taken in the report. He especially objected to what the gentleman had said about amalgam, that it had done more harm than good. Facts are stubborn things. Amalgam is useful, but it must be used with discrimination. It has been used in thousands of instances where no other material could have been so well used, and it has been a source of comfort to thousands of poor people unable to pay the expense of gold filling. Dentists who get into trouble with it do not know how to work it. But the aim of the paper is not to advocate the indiscriminate use of amalgam or of any other thing. The idea sought to be enforced is that no one material or method is the all of dentistry, but that conservatism and wise choice should determine what to use in any given case.

Dr. Gordon White, Nashville, Tenn. In regard to implantation, there seems to be no question that climatic influence bears a great part in the results. It has been said that Dr. Younger has been very successful for many years, and this appears to be true, so he had become convinced that the Western climate had much to do with that success.

The President. What Dr. Hunter said about the prevalence of soft teeth, coupled with Dr. Crawford's remark about the increase in diseases of the teeth, made him want to call renewed attention to the fact that the forceps is not now the most important instrument in the practice of dentistry. The increased number of causes for decay of the teeth attacks the skill of the dentist more than formerly. Gold fillings in the early days were known to be the best when the circumstances favored their use, and they were only put in in the most favorable places. Again, in view of the great growth of crown- and bridge-work, would you be willing to abolish the use of amalgam? Would you not use it in some cases to build up a broken-down crown? Crowning in proper cases is better than an amalgam filling, but amalgam certainly has its uses.

Dr. Henry E. Beach, Clarksville, Tenn., remembered an old minister saying that all prayers must necessarily be much alike, because mankind are needing the same help and must necessarily ask for the same things. If he understands the aim of dentistry, it is to save people's teeth; and when we discuss the saving of teeth we must say many things that are familiar to those who are successful, and we must say them over and over again, because all men do not understand them. He believes that it is within the province of two metals to save almost every tooth in the human head, and those two metals are gold and tin. The therapeutic value of tin is well known to those who have used it much, and he has been an earnest advocate of its use for a long time, particularly in those soft teeth which do not do well under gold fillings. He has been using it for twenty-one years, and it was a good while before some of the authorities could be brought to try it. Many denied the therapeutic influence of tin; but anyone can test the matter by filling two cavities, one with tin, the other with gold, in similar positions, where they are not subjected to the wear of mastication. The decay will recur under the gold and will not under the tin. He does not believe in the employment of tin to the exclusion of gold, and he does not use it extensively, but there are places and cases where it belongs as a matter of right. There are unquestionably many cases where the failure of fillings is because of imperfect preparation of the cavities. These should be excavated as long as little white specks are found in the enamel, and the excavations carried down until the walls are perfectly sound. Thoroughness is more important in this matter than the method by which it is done. He does not care by what method it is accomplished, provided the result is arrived at. Miller's paper, read before this association last year, called attention to the combination of tin and gold as a filling-material. One of the first operations the speaker ever saw was a filling of tin and gold, and he had had his attention called to one which antedated that twenty years, and which was so exceedingly hard that it could not be cut with an excavator. He, for one, should be slow to advocate the abandonment of tin in dental practice. Crown- and bridge-work has been both a success and a failure. If those present could examine some so-called crown- and bridge-work which he has seen, they would scarcely know whether to call it bridge-work or "botch" work. If bridge-work was to be of the character of some of this, he would say, "Good Lord, deliver us from bridge-work!" Last year Dr. Stubblefield said that he expected to hear next of the implantation of teeth for the purpose of mounting crown- and bridge-work, and now Dr. Crawford says it has been done. We want to be careful in undertaking bridge-work operations, because we have to take in the entire environment. We are told that we must put a crown on the anchorage tooth to prevent this slipping toward the gum-margin, but it is not always necessary, as we may sometimes be able to simply band the tooth, and cut out a sulcus to make an attachment for a lug to answer the purpose. It is not everyone who succeeds with crown- and bridge-work so well as the gentleman who advocates it so strongly; but everyone of a mechanical turn may hope to do excellent work in this line. So far as amalgam is concerned, the time has come when, instead of the large amalgam fillings which were formerly the only recourse in some cases, a gold crown can be used, and instead of using amalgam to build up the waste places, cement can be employed. One advantage is that the cement can be left in, while if amalgam is used, sooner or later it will destroy the crown. The necessity for crown- and bridge-work arises from one of two causes,—carelessness on the part of the patient in the care of the teeth, or inefficiency on the part of the operator. If the patient feels sufficient interest in his teeth to take proper care of them, and places their supervision in the hands of a judicious operator, there ought never to be any need for crown- and bridge-work.

Dr. Crawford thinks the place spoken of by Dr. Beach for the use of cement is the proper place for the employment of tin. It is an excellent plan to fit a collar, put in position, slip on the rubber-dam, put a mat of tin around the neck of the tooth, and over this a covering of cement.

Dr. E. P. Beadles, Danville, Va., had been listening to hear some mention of copper amalgam, but there has been no word of it. He has been seeing some things which appear worth thinking of. In his own practice he uses gold. He had spent some months out of the United States, and he had opportunities to examine operations by many good dentists. Some of these teeth filled with copper amalgam showed that they had never been properly excavated, but the teeth were preserved and the amalgam hard. He is somewhat enthusiastic on bridge-work, and in consequence he now feels that he will not do any more rubber work, and has so announced to his patients. Dr.

Beach has said that if a tooth is built up with amalgam and then crowned with gold, the crown will be destroyed. He should like to know why.

Dr. E. L. Hunter very well remembers the time when no one would acknowledge that he built up a tooth with amalgam. We want to discriminate all the time as to what is the best thing to do in any particular case. Why should we be so particular about the cervical margin, except that experience has shown that it is a point which must be carefully looked after? Discrimination in this as in everything else is necessary, and conservatism must govern practice in order to the best results.

Dr. Henry W. Morgan, Nashville. The paper is one of the most conservative in tone, and goes over the ground thoroughly, and discusses the subject candidly and judiciously. Regarding the use of tin at the cervical margins, he does not find any necessity for such an expedient. The same object can be attained by the use of gold. With reference to crown-and bridge-work, in his opinion a bridge is not justified under any circumstances unless you can have an anchorage of at least two teeth at each end of the structure.

Dr. E. L. Hunter. As to the value of tin or amalgam at cervical margins, the value is principally from the plasticity of the materials, but it is not altogether the plasticity; there appears also to be an electro-magnetic effect. If this produces any result, it must be therapeutic; and if a therapeutic effect is produced, it must be because it acts as a stimulus.

Dr. W. H. Richards, Knoxville, Tenn. Copper amalgam has points of helpfulness in two directions at least. With it one is enabled to make very soft fillings and place them in positions where not the slightest pressure can be exerted. It can be used so soft that it will spread when dropped, when it can be smoothed over the walls without causing the slightest discomfort to the patient; and it hardens in twenty-four hours, hardening up under the gum as nothing else does. In his experience it surpasses anything else in that place. In the setting of crowns he acknowledges being a good deal of an old fogy; he uses the Bonwill in many cases, and he finds the copper amalgam is excellent for setting them. He has taken out recently two gold and tin fillings inserted several years ago on the plan advocated by Dr. Miller, and he found them broken down, crumbling away, and not exerting the therapeutic effect that we have been led to expect from them. He began the use of tin at the cervical walls several years ago, and with good results, many of the fillings so inserted having been remarkably serviceable.

(To be continued.)

CHICAGO DENTAL CLUB.

A REGULAR meeting of the Chicago Dental Club was held June 22, 1891; Dr. A. B. Clark, president, in the chair.

Dr. E. L. Clifford read the following paper:

THE NECESSITY FOR CONSTITUTIONAL TREATMENT IN DENTAL PRACTICE.

MR. PRESIDENT AND GENTLEMEN: I enter into the discussion of such a subject as I have chosen with a marked feeling of timidity, and with a due appreciation of the stand taken by what we might term the different factions in our calling upon the question of the relationship of dentistry to medicine. The wheel of progress, however, never daunted, continues to roll on, and resting in the firm conviction of the ultimate triumph of truth and right, and an earnest belief that the day is not far distant when the progressive dentist will acknowledge with pride the debt he owes to general medicine, I would freely be placed in the category with those who assert that at the present stage of advancement and knowledge he cannot be held blameless who, through his ignorance of our underlying sciences or his persistent repudiation of their mastery, fails to relieve suffering humanity within his sphere, or so far detracts from the supremacy of our vocation as to be compelled to rely upon a more efficient brain; and more efficient simply because it has been trained in the fundamentals of all medical science. Not many of you, I take it, could have read the editorial in the June number of the DENTAL COSMOS, possibly the last token of warning left to our profession by our able and revered friend Dr. James W. White, without having forced upon you the great quantity of thought condensed in so little space.

Every paragraph seems radiant with truth, and every sentence such a condensation of fact as to render the entire article completely invulnerable to the attacks of an opponent. We must acknowledge and admit, *nolens volens*, "that no real advance is possible without familiarity with basal truths and principles"; that "the *majority* in every pursuit of life are handicapped by an insufficient knowledge"; that "they are mere routinists, doing that which they were taught to do in student days, and in ignorance of the reason why." Yea, verily, "they acquired learning without obtaining the wisdom." "In later life realizing their deficiencies, they hesitate to ask enlightenment through fear of exposing their ignorance, and thus remain in darkness."

In my hurried effort to prepare this paper, and while reflecting upon the different figures of speech that have presented themselves, one—"Our field of labor"—seems to rise with prominence, and to suggest that I liken our professional sphere to an immense farm. Upon this farm many different seeds are sown, and consequently subdivisions or patches are required. To more fully carry out our simile, and to make more prominent these several portions, I would claim as the entire farm the whole field of the healing art, or, more concisely, general medicine. The different patches upon that farm, corresponding with those usually set apart as best suited to different grains, whether corn, oats, or wheat, I would compare with the several specialties of the mother profession. To this end I would ask that you go with me for awhile to survey the hills and the furrows of that patch in our much-loved farm which has been sown with the seeds of dentistry, which has been continuously and energetically worked, and from which we hope to reap a compensating harvest. At the onset we are met with the conviction, which every-day experience is forcing upon us, that many tares have been sown with the wheat, but it has not yet been fully demonstrated to our satisfaction which are tares and which wheat. It is also evident to the close observer that some seed has fallen on good ground and some upon rocks ; therefore good and evil, paradoxical as it may seem, have been the combined results.

The entire field of dental therapeutics is too large for one evening's ride, and that your patience may not be taxed, but your interest courted through our entire stroll, I shall be forced to ignore many serviceable thoughts that crowd upon me and that may also be suggested to your minds. Where we do go, however, let us go with zeal, with an earnest desire for more light, and with the full determination to spread whatever rays may be discovered. Remember, "It is not faith, but the lack of it, that is displayed by those who dare not fearlessly search for truth and take the consequences of investigation. The real infidelity to-day is to be found with those who stand with their backs to the sunrise, and see no reality except in the shadows of the night that is passing away." It is a fact that within our day, for the first time in the world's history, adequate materials of knowledge have been gathered for the formation of rational opinions on some of the great problems, and the "thoughts of men are widened" to a comprehension of them. Out of this condition of things have been born some causes that have led to the investigation of new lines of thought upon subjects paramount to us in the great advancement of our specialty during the last decade. It was at one time considered a virtue to believe. It is so considered still, provided what we believe is the truth. If not, it is a virtue to disbelieve. And if we do not know, the only virtue is in doubt, keeping the judgment in a state of suspense until we do know. We will, however, in pursuing our march, give all due credence and value to popular impressions and verdicts, these having always a certain measure of fact and reason for their bases, however far from exact truth they may be and however exaggerated may be the deductions therefrom.

The time is not so far distant but that the memory must still linger within the minds of many of you when the medical armamentarium of the dentist was indeed meager. A bottle of creasote or carbolic acid, empirically used, and some preparation of iron, to be called into action in case of immediate and profuse hemorrhage, constituted all that was thought necessary. A little later Spooner immortalized himself in our profession by bringing to our notice and use an older agent, the use of which up to that time had not been demonstrated as of service to our calling. One thing, however, leads on to another, and when we learned that by applying an infinitesimal quantity of arsenic to the pulp its life could be destroyed, we were at once met with the fact that if allowed to remain *in situ*, fermentation and putrefaction would surely result. The demand for a preventive was at once felt, and searching minds and experimental natures set to work. How well these investigators have succeeded, your own knowledge of our history will answer; let us give due credit, however, to the spirit of advancement that has prompted the effort, and gladly acknowledge the debt we owe to those who have made us so far able to combat pathological lesions as they arise.

Up to this time dentistry had stood upon a precarious foundation. To this minute organ, the dental pulp, I assert we owe whatever of standing we may have attained to-day. Pathologists could not ignore its importance, and finding that they were forced to confront the fact that this little organ was a part and parcel of man's entire organism, that it was connected alike with digestion, assimilation, and nutrition, and therefore subject to many and the same deviations from our general health status as other larger and seemingly more important ones, they began to study its histology, physiology, pathology, and therapeutics. Led on by the results of these studies, it soon became apparent that they were indeed dealing with live tissues and functions. This being the case, it was only a step to conclude that a separation from the body corporal was an impossibility, and to the conclusion that if it was a part of the body and subject to the same deviations from health as the rest of the body, its pathology must be met by the same combating forces and influences that have proven so successful in other regions. Here, again, another stumbling-block was met in their course: the location and anatomy of this organ had no congener in the rest of the body. Almost isolated from its source of nourishment, being connected with it only by almost microscopical filaments and inclosed in unyielding osseous walls, some change from general therapeutics became a necessity. We therefore went back to first principles, to the field of medicine, and, searching through the barns and in the lofts of the old farm-house, there selected such tools as experience and perception told us would be of service.

Thus you see the connecting link has been formed; a new branch of an old science has been applied. It is a new child of the same parents, and more closely allied than a twin brother is the new-born infant, dental medicine. It is not a new plant that has found its origin upon our professional farm, nor is it a new species, but by grafting and ingrafting a new fruit has been produced, differing only from the older branches in the amount of cultivation it has received. Medicine is the same, to whatever part of the human organism it is applied, differing only in its application in our portion of the field, and this difference rendered necessary only on account, as I have stated, of the difference of soil and surroundings. As pathology, as physiology, as anatomy, as chemistry, in fact as all the fundamentals of our parent profession are the same wherever applied, so also are materia medica and therapeutics no less the same when utilized by the specialty of dental surgery.

And now what has this new hand upon our farm accomplished in the time we have demanded its services? What seed have we been able to sow, what plants to cultivate, and what fruits are we reaping, heretofore denied our most scientific efforts? It will not be denied, hence it would be folly to consume your time in attempting to prove the growth of our specialty in the past few years; and I feel I am safe in asserting that to no collateral branch of our science are we more indebted than to therapeutics and materia medica. True, pathology has furnished the soil, and, later, chemistry has proven the fertilizer, but without the implements of materia medica our harvest would indeed have proven meager and our efforts anything but encouraging. We are jumping, as it were, from the days of the old hand plow and wooden-toothed harrow to the more scientific workings and accomplishments of improved agriculture. From being forced, as was the case only a few years ago, to confine our efforts toward ameliorating the sufferings of mankind to extraction, to filling of simple cavities, and to the construction of artificial dentures, we are enabled to assert and to maintain that it is our office to save and not destroy.

A short time ago pathologists and investigators in the field of conservative surgery were ready to exclaim that the royal secret had been found, the key to which could certainly be located in the study of mycology. To the discovery of sepsis and septic influences we bow in due acknowledgment, but "all things change, and we change with them." A great step had been taken, a new mile-post had been marked, but, as is usually the case upon all roads to scientific advancement, a stream, unprovided with a bridge to be utilized by the wayfarer for crossing, was finally encountered. Demonstration has certainly proven that not all micro-organisms are pathogenic in influence, and it has also endeavored to prove that many of the advantages and successful results following the application of our antiseptic remedies must have been from causes other than their power to inhibit or destroy microbic life. You are doubtless well aware that the results of recent workers in this field, almost without exception, tend to prove the inability of most of our most cherished remedies to prevent the further development and growth of these lively and most interesting enemies to physiological quietude. But while theories and conjectures look well upon paper, facts and practice are continually staring us in the face. All of our experiences certainly force the conclusion that we dare not entirely ignore the influence of these agents in destroying our best efforts to plow our row toward the goal of successful results. No branch of medical science has perhaps received more attention in the recent past, and no branch has been followed by more persistent efforts furnished with the best brain and muscle. Still a cloud of mystery and uncertainty envelops our horizon, and, though much to be deplored, we are forced to acknowledge that we must call to our aid daily the empirical divisions of modern therapeutics.

I take it for granted the two general divisions of therapeutics are fully appreciated and understood by the scientific in our profession; and while all efforts of our workers should tend to the development, growth, and final establishment upon a firm rock of the rational branch, we must confess that until that time does arrive we, in using the best means at our command, cannot entirely thrust aside the empirical. By rational therapeutics we of course understand that it is our duty to use our remedial agents through scientific motives and for scientific results; that is, that we first make it our duty to understand, and as far as possible to appreciate the importance of the pathology of the case in hand; then, having carefully selected our remedy on account of our knowledge of its chemistry and its therapeutical action, to so apply it as to produce certain results. Empirical therapeutics we would understand as that application of a given remedy to certain symptoms simply from the fact that some fellow-practitioner had reported at a society meeting, or in the journals, that the said remedy had proven beneficial in an apparently similar case in his hands. Now, as long as our theories in the field of pathology are being so continuously overturned and upset, of course I am forced to acknowledge the apparent impossibility of confining ourselves to a strict compliance with our desires. We cannot discontinue, for the present at least, the application of arsenic to the troublesome pulp for the purpose of destroying this weed in our garden simply because we do not know how the agent acts, whether life is destroyed by irritation and strangulation, by thrombosis, or what not. Neither can we lay aside from our armamentarium our iodoform, simply because investigators prove to us that microbes exist, flourish, and multiply in media thoroughly impregnated with this agent; nor can we afford to relinquish our claims upon our much-valued peroxide simply because we find that under certain conditions it proves irritating, this effect being accounted for by some theorists on the ground of the presence of an acid, said by one to be sulphuric, by another hydrochloric, thereby acknowledging an ignorance of the remedy as well as an ignorance of its effects. Let these old stumps spotted here and there upon our farm all tend to strengthen our resolves to plow our furrows straighter and straighter every year, until at last complete removal will be the result, order will be brought out of chaos, and symmetry and perfection will prove our reward.

And now, gentlemen, I feel that I have been sermonizing too long. To continue this line of thought to the point my inclination would lead me might be accomplished in a series of lectures; but to obtain the best results for our present purpose I must ask your indulgence for any seeming digression. In order to establish landmarks by which to guide discussion, and to concentrate our efforts as much as possible, my hopes will have been realized if I can succeed in getting you to make an application of the foregoing to the subject in hand. To the thoroughly grounded in general principles it must be apparent that this line of action would prove an impossibility to the mere routinist, and also to him whose preliminary training and education had not properly fitted him for the wide scope of special practice. It seems to me to be equally as apparent as the difficulties under which he would labor who attempted to cultivate a patch of wheat without any regard for the underlying rules and experiences of general farming. Now, if this preliminary training is essential and valuable, it becomes at once evident to the reasoning mind that in the pursuit of any special vocation the application and practice of the general rules and principles become a necessity, and thus we are brought to the contemplation and application of our subject proper, "the necessity and advantages of constitutional treatment in dental practice."

Those of you who have kept apace with our history, or those of you who have digested the facts as contained in Dr. Talbot's paper so recently read before the Section of Dental and Oral Surgery at the last meeting of the American Medical Association, must have become convinced of the fact that such was the aim and desire of even the pioneers in our profession. From the numerous quotations so freely used by the above-named gentleman, we must be convinced that even the antediluvian had a full sense of appreciation of the relation of the general to the special, and that every mile-post which marks an era in our onward march from thence to the present time is decorated with garlands emblematic of these truths. Such being the case, does it not seem presumptuous in the "latter-day saints," who would proclaim dentistry as an independent profession, to urge upon us the necessity of cutting adrift from the ocean steamer that has so successfully plied the waters of our professional sea for "lo, these many years," and by bidding defiance to experience trust our fate to the life-boat appended to her sides? Verily, "the fundamental requisite is a higher standard of admission." "The only safe ground is art founded on science, on a thorough appreciation of the relation of the general to the special."

To be able, therefore, to successfully cope with the requirements of modern advancement, preparation is necessary, reinforced by sound judgment and quick perception. No doubt many of the lesions which are presented to the modern dentist for treatment find their primary causes in remote parts. The intimate connection through the sympathetic system renders this possible, aye probable, in many more cases than the casual observer would at first believe.

Reasoning, then, from cause to effect, is it not more intelligent to set aside in these cases our dependence in local applications, and with due caution and judgment conjoined to true alterative treatment reach the very foundation, and in most cases be repaid for our skill by striking the enemy in his lair? How many of us have had the chagrin and mortification, consequent to the experience of a series of cases apparently similar in outward manifestations, to find that a course of treatment which has proved successful in others has utterly failed to respond to the demand for relief in a given case! If we are mere routinists, we are indeed in a dilemma. But, if we have prepared ourselves by ample attention to the general, we arise phœnix-like from the emergency, and our patients leave us with gratitude. In a majority of cases these disappointments are brought to our offices by constitutional differences in the great family of mankind, and without doubt are more easily conquered by corresponding forces.

The question may arise in the minds of some as to the legality of a prescription bearing only the signature of a D.D.S. In answer to such, I would refer you to the able lecture, so recently enjoyed by this club, from Dr. N. S. Davis, the deductions from which tend to prove the very points I am trying to establish. You are well aware that the American Medical Association now recognizes as eligible to membership, and consequently as practitioners of a specialty of general medicine, the graduate of such institutions as require a knowledge of the fundamental branches equal to a reputable medical college; it is therefore obvious that those who have complied with these requirements, and in practice manifest ordinary skill and ordinary caution, are expected to employ such measures as will best tend to the amelioration of the patient in hand. It is our province to treat disease of the oral cavity; and any deviation from the normal is disease, and, being subject to the laws that govern fundamental medicine, is truly within the scope of the competent dentist. What, I ask you, would be your reward in an attempt to treat a case of facial neuralgia, aggravated by a congested pulp, in an anæmic female patient whose bowels or uterus were surcharged or engorged with contents that should long since have been evacuated? Would local treatment cure the disease, or merely palliate and conceal the lesion until such time as nature's forces again regained the mastery? Will it be argued by any that this patient must be sent to a general practitioner for a cathartic because the dentist has not been sufficiently educated to relieve the cause? and even in extreme and aggravated cases of continued pain, when sleep and rest become essential that exhausted nature may have an opportunity for recuperation, must we admit to our patient that his malady has overstepped the bounds of our ability, and advise that he seek relief from some one who has taken advantage of what most dentists have neglected? Going further, a patient presents whose natural or hereditary tendencies indicate a rheumatic diathesis. Pain has manifested itself in the teeth. Shall we extract; shall we apply palliatives, in order that in turn we may have another sitting and another dollar; or shall we with true honesty and competency diagnose the case correctly and be prepared to combat the assaulting forces? Again, take a case of hæmophilia. Shall we advise the patient not to have his teeth extracted, or shall we, if necessary, take hold of the system and by proper treatment fortify it against any such peradventure as active and rapid hemorrhage? Again, many cases present themselves for our assistance in which the entire nervous system of our patient has been sorely tried, and in which condition none will deny that our best efforts will prove but vain. Is it our duty under such circumstances to further strain and tax such natures, or is it within our power and province to render such assistance as should follow judicious alterative measures? Far be it from me to urge that the dentist is to usurp the prerogatives of the family physician. It is only my desire to maintain that he should qualify himself by proper education to be subservient to none, so that when the exigency arises his true independence will be manifested by his competency.

Discussion.

Dr. W. W. Allport. The scholarly and thoughtful paper just read cannot be discussed at a moment's notice. I regret exceedingly that the doctor did not have time to conform to the rules of the club, and give us an opportunity to read his most excellent paper before it was brought here to be read and discussed. I certainly do not feel able to criticise it, and certainly cannot find language to commend it too highly.

The writer speaks of the last editorial of Dr. White; it was an able paper, and invulnerable. There was no chance for adverse criticism, and I desire most sincerely and heartily to record my appreciation of it. He pertinently asked the question whether dentists are generally qualified to discharge their professional duties as pointed out in the paper this evening, and to properly diagnose and prescribe for constitutional troubles. No one can do this without a knowledge of general medicine, general surgery, general pathology, and general physiology. One must have the fundamental principles in order to make an intelligent specialist, and the matter of prescribing in such cases will require a most profound professional knowledge ; and unless one has the general fundamental principles, as I have contended for a great many times, he is not able to become even an intelligent student, much less an intelligent practitioner, in any specialty of medicine. I think the day is too far gone to discuss whether dentistry is a specialty of medicine, or whether we are an independent profession. It goes without saying that dentistry is a specialty of medicine, and if we are not qualified to diagnose and prescribe for cases as we ought to be, where is the fault? What is the trouble? Is it because dentists have not the natural ability and education to grasp the general principles that the general practitioner of medicine has been taught, or is it because our colleges are not composed of the right sort of men? It cannot be that we have not had the ordinary intelligence that medical students possess. If the fault is anywhere, it is in the teaching of our colleges. We are not broadly enough educated to become intelligent specialists. Why is this so? We have only got to go back and look the ground over upon which we have been building, and take the antecedents or the constitution, so to speak, and you will see where the fault lies. It is not more than fifty years since Dr. Harris conceived the idea that dentists should be medically educated, though at that time there were few medically-educated dentists. There were about twenty itinerant dentists who went around the country to one really medically-educated dentist, and he desired to educate them, and the whole set became intelligent practitioners and sought connection with a medical college for that purpose. Dr. Harris was refused. He was not permitted to make the connection, and as a matter of necessity, not from his choice, he established a dental school. He said in his first lecture, which I quoted some five years ago before the American Dental Association, he hoped to see the time come when dentistry would be recognized as a department of medicine, and especially an important department of surgery. He hoped to see the day when dentists would be medically educated and justly be recognized as special practitioners of medicine.

Our dental schools have done a great deal of good ; but the teaching in that dental college was very meager, and it has gone on from that day to this in the same way. It is a little anatomy, a little physiology, a little chemistry, a little therapeutics and materia medica, with very little surgery and general pathology. Any gentleman who is medically educated knows that the method of teaching pursued in our dental schools is absolutely kindergarten work, and with such a method we can never have broad-minded dentists. They will never become learned in the general principles ; they will not become intelligent students, much less practitioners of a specialty. This condition of things has gone on for fifty years, with a little improvement in this and a little improvement in that dental college. Sometimes they attach themselves to a medical college for proper teaching ; others go along in the same way, yet they assume that they are a profession by themselves with this meager medical teaching. I am inclined to think that the profession will never be greatly improved until our dental schools are embodied in connection with medical colleges, and students shall be required to take the same medical course, so far as general principles are concerned, that medical students have to go through. The university schools have this course ; the independent dental colleges do not have it. I do not wish to reflect upon the dental colleges ; I simply speak of what I believe to be true, and what every man here knows to be the truth, that the independent dental colleges do not have that particular medical teaching that will make dentists what they ought to be.

We have not caught up to the idea that Dr. Harris put forth fifty years ago. What did he want? He never wanted an independent dental college. He wanted connection with a medical college, and wanted dentistry to be a department of medicine, under the guidance and general management of medical schools, making it a specialty of medicine, the same as ophthalmology or gynecology. That is what we want. I hope the time will come when we will have just the thorough grounding in medicine that every other specialist has, and when we do have it we will have intelligent practitioners, who will be prepared to take hold of cases and treat them constitutionally. Very few of the members present, who are simply graduates of dental colleges, feel qualified to do this. I do not believe there is a man here, who, having made no special study of medicine, would say he felt competent to treat these cases medically.

Dr. E. S. Talbot. I regret very much that I did not have the paper to look over, because the writer has chosen a subject which I am deeply interested in, and I would like to talk intelligently upon it ; but having it sprung on us this evening somewhat unexpectedly, I hardly know where to commence or what to say upon it. It is one of the best papers I have heard on this subject. I am very glad we have a member in our club who can express the views which the essayist has stated so clearly, earnestly, and truthfully.

The dental colleges are at the foundation of the future education of dentists. If they would connect themselves, as Dr. Allport has said, with medical colleges in such a way that members of our profession would receive a thorough medical education, there would be no question that in a few years we should be able to hold as high a position as the medical profession.

Another point which I would like to say a few words about is with reference to the practice of dentistry. Very early in my experience as a dentist I learned that I could not practice dentistry successfully without taking a thorough medical course. I can assure you to-day that I can practice dentistry with a great deal more skill, and do justice to my patients to a greater extent, than I could if I had not taken a medical course. While I do not pretend to be any better practitioner than some others in this city, yet I do know that no man can practice dentistry successfully without being a graduate of medicine in all its departments.

A case in point comes to my mind at the present time, a case of pyorrhea, where it was simply impossible to treat the case successfully by local applications alone. The patient had to be treated constitutionally. His system was debilitated, and when pyorrhea comes on resulting from a vitiated condition of the general system, good, sound teeth are lost. This patient was unable to masticate his food properly, consequently constitutional treatment had to be resorted to. It is necessary for us in such cases to build up the system.

A case was brought to me to-day where a dentist, who has been practicing in the city for some length of time and has never been inside a dental college, yet is a good practitioner, drilled squarely into the nasal cavity while seeking the antrum. It seems that a man with twenty-four years' practice should know better than that. It was a mistake arising from lack of education, and if he had been acquainted with the anatomy of the face the blunder would have been impossible.

Another instance is where a patient comes to us with neuralgia in the last tooth,—for instance the third molar, which being extracted, the pain is located now in the second molar. In this manner many sound teeth are removed, one after another, and yet the patient is not cured of the neuralgia. I saw such a case to-day. It is impossible, as the essayist has said, to practice upon any part of the body unless we understand anatomy, physiology, chemistry, materia medica, etc. Those students who have the good of the profession at heart must make up their minds that without a thorough knowledge of medicine they cannot practice dentistry successfully.

Dr. A. B. Freeman. A strong argument in favor of constitutional treatment, as recommended by the essayist, was the case of something akin to anchylosis of the left temporo-maxillary articulation in a young man thirty years of age, which was shown here by myself something like four months ago. You remember that the articulation had been closed for five months, the patient not being able to open his teeth sufficiently to introduce a case-knife between the incisors. He had consulted physicians and surgeons ; he had consulted dentists and had teeth extracted, and yet without any benefit whatever. It was a very plain case to me, and as the patient was not under my care, nor that of anyone else at the time, he came to me at my request and I presented the case to the club as one both interesting and rare. It was recommended at that time that he be put upon mercurial treatment. After following this out for two months, the articulation relaxed completely. A month ago to-night I met the gentleman, and he told me he had gained complete relief. As I have before said, this is a good argument in favor of constitutional treatment, especially in obscure cases.

Dr. E. J. Perry. Didn't he apply to a physician and surgeon?

Dr. Freeman. Yes, but he didn't get a prescription of the character mentioned. One of the surgeons made a diagnosis of a tumor in the region of the articulation on the left side. The probabilities are, since this treatment has been successful, that it was a syphilitic deposit in the joint, though no such history could be drawn from the patient.

Dr. Perry. I think the successful treatment of the case is a strong argument in favor of dental education. I most heartily commend the very ably written paper we have heard this evening.

It has been written between the lines in the paper, and brought out by the discussion, that a purely dental education is insufficient to the practitioner of dentistry. To this I dissent most decidedly.

I congratulate myself that I am a regularly registered dentist, or otherwise I might have to study over again. Or did I make a mistake in going to a dental college? One gentleman has said some one drilled through into the nasal cavity when in search of the maxillary sinus ; he knows that the knowledge of this bone is better taught in dental colleges than in medical schools. I know of the near kinship of the dental profession to the medical, but I want to go on record as one who believes we are an independent profession. Dental pathology, dental therapeutics and materia medica are specific, and are only taught in dental colleges, and can never be taught by the general practitioner. And I here protest against this common assault upon the dental degree.

As to constitutional treatment, I rarely attempt it. I never write prescriptions for general treatment ; I work in connection with the family physician, and where advice or treatment is necessary I seek him out ; he knows the patient's constitutional peculiarities best, is best fitted to assume the care and responsibility, and by experience and education best qualified. I am the dental doctor. Does not the oculist do the same, and is my position less dignified? I will venture the assertion that Dr. Allport has made his great reputation in this community,,and in the dental profession, upon his skill as an operator and as a good conservative practitioner of pure dentistry, rather than by his skill in the use or knowledge of drugs or general medicine. He owes his usefulness to the world and his profession to his purely dental skill and knowledge. Now, dentists of Dr. Allport's class do not write prescriptions. Search this city in the drug stores for prescriptions written by dentists. They are as scarce as "hens' teeth."

In case of apical pericementitis where I feared alveolar abscess, I would institute abortive treatment. I would attend to the local treatment; the family doctor, the physic. I might suggest a saline cathartic or hygienic measures. I do not think any dental school teaches too much, nor too much of the general as applied to the special. The broader and deeper a man's education is laid, the better he will be equipped for his life-work. I hope the profession will work itself up to the high level that the gentlemen of the club hope for. Common sense cuts a big figure in this world, and has often worsted the most cultured. Keep your eye on the practical. This question of the higher education is idealistic. I like to look at it: it is beautiful to listen to and to think about.

Dr. Charles P. Pruyn. After listening to the previous speaker, I am now ready to talk upon this subject. And, first of all, allow me to express my appreciation of the able effort of the essayist of the evening. I think I am in hearty accord with most of the sentiments expressed in his excellent paper, but I do want to put myself upon record as being diametrically opposed to the ideas and sentiments of the gentleman who has just spoken before me upon this subject. If I had the slightest idea that the sentiments he has just expressed were the prevailing thought of all those who are practicing dentistry to-day, I should feel that we were retrograding rather than advancing; but such is not the case at this time, as I feel clearly convinced that we are twenty-five years in advance of such mediæval utterances. The time will come when all dentists will be medically educated. We are now working to that end; and if you live twenty-five years you will see it, or your children will see it. We want to see all members of our chosen calling well grounded in the fundamental principles of general medicine the same as any of the other specialties. This is the way men get to be expert specialists, by having a broad and firm foundation upon which to erect a reputation as an authority in any given line.

Dr. J. W. Slonaker. When I attended college, we were taught dental materia medica and therapeutics. At the same time we were also taught the application of medicine to the general system,—not in a very comprehensive manner, but instructed repeatedly in the use of cathartics and such remedies which we should always have at hand for the treatment of diseases of the teeth ; and this instruction did more for me in my specialty than any other instruction I can think of to-day. Many a time in the course of my practice patients would come into my office suffering from neuralgia, having had possibly five or six teeth extracted, the remaining teeth being perfectly sound, and still have neuralgia ; and after treatment by the family physician they would almost invariably get entire relief.

I have regretted not taking a medical course. It would assist me materially in treating my patients after the extraction of teeth. With Dr. Pruyn, I hail the day when all dentists will also be doctors of medicine.

Dr. E. L. Clifford. I have very little to say in the way of closing the debate. I had hoped the paper would have brought out a little more general discussion on this subject.

We have had scientific papers ; we have had papers on practical subjects, office experience, and things of that kind, but we have not had, up to this time in our club, this subject before us for discussion. As I said in my paper, I am thoroughly cognizant of the fact that we have in the profession those who believe that we are part and parcel of what I call the "body corporal." If we are a specialty of medicine, it is necessary to be grounded in the general principles of medicine. We have those also in the profession who believe that we started out on independent ground, that we have built ourselves up to what we are to-day independent of the medical profession, and that now, after the success we have already attained, we are trying to hang ourselves on to the side of the medical profession. It was not my intention to enter into that part of the subject which pertains to the merits or standing of the profession. It was only my intention to impress upon the members the fact, that with a medical education—and I do not believe any man can know too much—they can do better work and practice the profession with more satisfaction to themselves than they could if they completely ignored any part or parcel of medicine. It makes no difference what that branch may be.

It may be surmised by some members of the club, judging from the remarks that have been made, that I hold the degree of M.D. I do not. I am not a graduate of a medical college, and all the advantages I have received have been received in a dental college and in a dental office. I have, however, felt the great importance of that knowledge. I have felt a necessity for it to such an extent that I have bought every book I possibly had the money to buy since I got through a dental college, feeling at the time that I was not prepared to practice my profession as I would like to practice it. I have studied all I could study by myself. My responsibilities and the tax upon my time have been so great that I could not go to a medical college and take the degree of M.D., but I have profited somewhat by my studies.

In answer to Dr. Perry's remarks, I can only say that his statements were the best argument in favor of my position of any I think that were made. He acknowledged that he feels the necessity for a medical education; he acknowledges that he cannot reach certain patients and the pathology of certain affections on account of inefficiency in preparation for such cases.

It was not my intention, as I said in the paper, to take the place of the family physician. It is not necessary that we should write every prescription for every patient that comes into our office, but we cannot diagnose a case accurately unless we understand the physiological, anatomical, and clinical history of the patient. A patient may come to you with a rheumatic diathesis. How are you going to tell whether he has rheumatism or gout, unless you understand the principles of medicine? If you put a bridge or a crown upon a root, and the patient comes back the next day with face and jaw all swollen, with an acute pathological condition existing, are you going to remove that bridge or crown and then have to do the work all over again? It is this line of general principles that will keep you from doing it. It is not necessary, if you have done your work properly in the first place; and the fact that you have done your work properly is no guarantee that these lesions will not arise. There is a certain kind of repair that must go on which cannot go on without a proliferation of cells. Regeneration without acute symptoms is an impossibility, and if you can tide a patient over that by proper alterative treatment you can save not only yourselves from mortification, as well as time and labor, but you can save the wear and tear on the nervous system of the patient which you necessarily subject him to if you undertake to do the work over again. Consequently, I say, in thousands of cases, if we were sufficiently grounded in the fundamental principles of medicine, we would be able to give greater satisfaction to our patients.

I intended when I wrote the paper to go into a consideration of certain medicines and their action upon cases so far as I believe it is within the province of the dentist to do so, but the paper was too long, and there was not sufficient time for me to do it.

I want to repeat, in closing my remarks, that I would not like to have any of the dentists feel that we should usurp the place of the family physician. You should work with him all you can; but there are certain prerogatives you are entitled to, and to which the family physician has no right.

COPPER AMALGAMS.

Dr. B. S. Palmer. I have been asked the following question : Has copper amalgam a place in dentistry? If so, when indicated and when contraindicated?

I do not know that it adds to one's credit to advocate the use of copper amalgam in a dental society, because everybody seems to talk as though gold was the only proper filling. I venture the statement, however, that those dentists who resort to the use of gold exclusively will, when it fails, fall back on copper amalgam to save the teeth ; therefore I would say that copper amalgam has a place in dentistry, and an important one, too. If the mission of dentistry is to save teeth, it has a place in dentistry ; if it is to ornament and beautify, there are other fillings which will beautify the teeth much more than copper amalgam.

I suppose it is expected of me to answer that part of the question, "when indicated and when contraindicated." I cannot answer the question definitely. Its most serious objection seems to be its tendency to wash or waste away in some mouths. Dr. Ames thinks this washing out is due to galvanic action, and that it occurs most frequently in mouths that are acid. That is so to a great extent, but it does occur in mouths where the secretions are alkaline. Aside from this, it does its work admirably ; it will save teeth in many cases where, in my opinion, nothing else will. Take the class of teeth that is most discouraging to work upon,—uncleanly mouths, for example, where the teeth are covered with secretions and everything surrounding them is in a condition to produce decay. We know that it is almost like throwing away time to put gold in these teeth ; but they are the ones where copper amalgam will do the most good. They are the poorest class of teeth. When any other filling would be a failure, copper amalgam will save teeth in a great many instances. It seems to me that the most brilliant success with copper amalgam has been in those mouths where no other material seems to be indicated.

Again, those white, chalky teeth that are so subject to decay, and even when we fill, no matter with what, we soon see a line of broken-down tissue around them. Copper amalgam will keep them. That has been my experience. Dr. Harris and myself have used copper amalgam extensively for the last three years. I have never seen one of our fillings that has decayed around the copper amalgam during that time. As I said, the wasting away seems to be the only trouble, and I think that is due to improper manipulation.

I have had various samples of copper amalgam,—I think nearly every kind I have heard of,—and I have experimented with them somewhat. The chief trouble is the excessive amount of mercury in them. If heated and used just as it was precipitated, it does not matter how much you squeeze it, you still have an excess of mercury there. If you squeeze it so dry as to crumble, lay it away, let it set, and then heat it again, you get almost as much mercury as you do the first time. I have been experimenting with it in that way at different times. I find I can work copper amalgams over three or four times, and then get out an excess of mercury every time.

A member. Does it set quicker?

Dr. Palmer. Yes, it sets quicker. I have also had samples advertised as the finest copper amalgam on the market that were full of dirt, and it took me an hour to wash out the dirt and oxide before it was suitable to use. Squeeze out the mercury, let it set until hard, work it again, repeating the process several times, and you then get an amalgam that you can use and that will give satisfaction. It is a material that should be used only in cases where it does not show, because it turns black. If it does not turn black, it does not do its duty. The blacker the better. It seldom discolors the tooth itself, unless a pulpless one, when it is certain to do so.

Dr. A. E. Matteson. I would like to ask Dr. Palmer if he has ever tried gold and amalgam.

Dr. Palmer. No.

Dr. Matteson. Do you know of its ever having been tried?

Dr. Palmer. No. What would be the object?

Dr. Matteson. To prevent discoloration.

Dr. Palmer. I doubt if any amount of gold would prevent discoloration.

C. E. Bentley,
Secretary Publication Committee.

CONNECTICUT VALLEY DENTAL SOCIETY.

REPORTED BY GEORGE A. MAXFIELD, D.D.S.

The twenty-seventh annual meeting of the Connecticut Valley Dental Society was held at Holyoke, Mass., beginning on Wednesday, June 10, 1891.

The meeting was called to order by the president, Dr. E. S. Gaylord.

The special committee on necrology reported resolutions on the deaths of Drs. W. H. Atkinson and F. Searle. A life-sized portrait of Dr. Atkinson, wreathed in flowers, graced the platform.

Dr. W. H. Rider, of Danbury, Conn., read a paper on "Comparative Anatomy."

Dr. Wm. H. Metcalf, of New Haven, Conn., read a paper on "Vitreous Fillings,"* in the discussion of which Dr. Wheeler recommended the use of rouge mixed with alcohol, which if placed in the gold matrix before the glass is fused in it will roughen the under side of the finished inlay so that the cement will readily adhere to it.

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*This paper will be found on page 848, current number of the Dental Cosmos.

Dr. B. C. Russell said that "if the glass is fused according to Dr. Timme's method in a little piece of platinum thoroughly perforated, there will be no need of rouge or anything of the kind for producing a roughened under-surface."

Dr. D. Murless, Jr., in speaking of the device of Dr. Herbst for holding the rubber-dam above the margin of cervical cavities, said that if the point of the needle was made somewhat less sharp than the ordinary needle-point its application was less painful. It had occurred to him that it might not be altogether a good plan to force the needle-point into the cementum, as was done by Dr. Herbst.

Dr. C. H. Land said that the subject of vitreous fillings covered not only glass but porcelain ones; the color of the glass referred to in the paper is produced by fusing red lead with it to obtain what we call amber glass. More than one hundred per cent. of red lead is used to produce this shade, which is not a very stable one. The heat required to fuse this glass will drive off part of the lead and so change the color. We can never get the same kind of translucency with glass as with porcelain. It may be advisable to use glass in many cases, and a great deal easier, though it is anything but the type of perfection in vitreous fillings. My first experiments with vitreous fillings were with glass five years ago. I went on step by step until I came to the conclusion that the higher the fusing point of the veneer the more nearly perfect was the work. The coloring-matter for the yellow tints in glass is, as I have stated, lead and iron. When glass is used, it is very apt to check, and while we can use them for only a limited class of operations the glass-inlay method has one strong point in its favor, namely: that everyone can use it. I will show you that I can fuse porcelain in almost the same time that you can fuse glass, with very little more work than the use of an ordinary blowpipe and almost as cheaply. I find porcelain far superior to glass, and can furnish a record of six hundred operations in five years. It is an important subject in dentistry, and I am glad it has been brought up. My claim to priority of invention in this matter of vitreous fillings will be substantiated by a reference to the August number of the *Independent Practitioner* for 1886, and also to an article in the same journal entitled "The New System for Filling Teeth," published during the latter part of the year 1887.

Dr. E. A. Stebbins, of Shelburne Falls, Mass., read a paper entitled "What Value has Argenti Nitras as a Therapeutic Agent in Dentistry?"

Dr. W. L. Roberts, of Weymouth, Mass., read a paper on "Nye's Plastic Gold."

Dr. C. A. Brackett, of Newport, R. I., read a paper on "Some Points in Parenchymatous Injections."

Dr. A. J. Cutting, of Southington, Conn., read a paper entitled "My Experience with Cocaine," an abstract of which follows.

In speaking of his experience with the use of cocaine, after giving a historical sketch of its introduction and use in dental and surgical practice, he said that as a whole his experience with the drug had been a pleasing one. He had found it so helpful in his practice that he would not now willingly do without it. He had used it in nearly all departments of dental practice where a local anesthetic was required. He had also used it in removing particles of steel or emery from the eyes of workmen in the shops at Holyoke, who had applied to him frequently for such service. In all these cases the use of cocaine has been highly satisfactory to himself and his patients. His largest experience with cocaine has been its use as a local anesthetic in the operation of extracting teeth. He finds that it always obtunds the soft tissues so that the application of the forceps is absolutely painless, and it is his belief that it is this part of the operation that patients generally dread the most.

In reference to the opinion which the essayist claimed was held not infrequently by dental practitioners, that the effect of cocaine was largely due to the imagination, he cited the statement by Dr. Turnbull in his essay on cocaine,—"There is no dissembling in children. Give them an occasion to cry for pain, real or imaginary, and they usually take advantage of it. Some of the best tests of the anesthetic effects of cocaine are obtained from this class of patients,"—and in proof of the correctness of the statement quoted he cited his own experience with the drug when used for the treatment of children, the results uniformly obtained leaving no doubt in his mind as to the pronounced analgesic properties of cocaine. His method of using cocaine for the painless extraction of teeth and roots is to inject with a hypodermic syringe into the gum-tissue on both sides of the tooth a sufficient quantity, usually from two to four minims of a four per cent. freshly-made solution, and by using a small and sharp needle he finds there is generally no complaint about its insertion; but if there should be, it can be obviated by applying a drop of the solution on cotton to the gum before inserting the needle. His use of it as an obtundent of sensitive dentine had not been uniformly successful, but in a number of cases he had obtained good results by first drying the cavity and placing in it one-sixteenth of a grain of the drug, which is then moistened with a drop of warm water. This is sometimes so effective after five minutes that he is able to excavate painlessly to a depth more or less great, depending upon the density of the tooth, when another application will have to be made if more excavating is to be done. He finds, however, that there are teeth in the treatment of which, even in this strength, the drug is without value as an obtundent. His use of it for the immediate extirpation of the dental pulp has been altogether unsatisfactory.

He called attention to the necessity for guarding against accidents in the use of cocaine, which might occur as they do with any other drug when incautiously used, and emphasized the value of using only a freshly-made solution of known strength, so that each minim would represent a definite quantity of the drug, in the use of which it was at all times possible to administer doses accurately measured.

In the event of untoward symptoms being manifested, he recommended placing the patient in a horizontal position and the administration of cardiac stimulants, especially brandy and amyl nitrite.

Dr. L. D. Shepard had used cocaine in his practice, but not to the extent of the essayist ; his reading of the reports of accidents attending its use had made him cautious in his use of it. He had found it valuable for obtunding the gum-tissue during the adjustment of crown-work, and when used for this purpose a crown could be adjusted painlessly. He used a four per cent. solution, which was made freshly every few days. He observed no change in the solution after two or three days, but on standing for a week or ten days vegetation appeared, which was a sufficient reason why fresh solutions should be used. He uses for injecting the solution a small thumb-rubber syringe holding from five to ten drops, which he obtained in London many years ago, before the Dunn syringe was brought out in this country. He has found cocaine useless for obtunding sensitive dentine, which he attributes to the fact that it has to be used in solution. He has never found anything which if put into the cavity would diminish pain and not injure the tooth. He had never used cocaine in the operation of extracting teeth. He thought that if the drug could be sealed in a cavity for a length of time an obtunding effect could be produced which might be sufficient, but as ordinarily used with creasote or carbolic acid it is of doubtful value, because it is not kept in contact with the dentine long enough.

Dr. N. Morgan had not had success in the few experiments he had made with cocaine, and believed that it was uncertain, if not dangerous, in its action.

Dr. B. C. Russell had noted a peculiar systemic action from cocaine even in very small doses. He found by injecting a few drops of a two or three per cent. solution he could control the extreme nervousness of some patients ; with one whose teeth were very sensitive it seemed to affect the system as opium does.

Dr. C. H. Land once had an abscessed tooth extracted from his own mouth under the influence of cocaine which was injected into the gum-tissue around the tooth. It seemed to have no effect whatever, as the pain of extraction was intense. He believed that so far as anesthetics were concerned they could not be used without affecting the whole system.

Dr. L. D. Shepard asked if Dr. Land did not use it in crown-work. In reply, Dr. Land stated that he had crowned almost every tooth in the head and never used it.

Dr. J. F. Adams had used cocaine to a limited extent in extracting teeth and as an obtundent for sensitive dentine, with gratifying results to himself and patients, and was very much in favor of it for these purposes.

Dr. C. W. Strang approved of the method which the essayist suggested of first bathing the mucous membrane with a drop of the solution and then introducing the needle slowly, meanwhile forcing the solution into the tissue as deeply as desired, which could be done painlessly in this way. He agreed with the essayist in his statement that it was a drug that should be used cautiously. Some five months previously he had had occasion to explore a root-canal at the apex of which there had been an abscess for several years, and considerable absorption of the tissue about the root had taken place. Two drops of cocaine solution and two drops of a solution composed of oil of cinnamon and a five per cent. solution of carbolic acid were injected through the canal into the abscess-cavity ; about two drops followed the needle out. In about three minutes perspiration started from the patient's face, and her skin became clammy. She was at once placed in a recumbent position and stimulants administered, but it was fully fifteen or twenty minutes before she entirely recovered. He approved of its use externally as a local anesthetic, and had had most gratifying results from its use in this way, especially in crown-work.

Dr. Shepard spoke favorably of its use as a local application where it was necessary to push the gum away from the neck of a tooth. A strong solution in cotton packed around the neck of a tooth and allowed to remain in position for ten minutes, produces complete anesthesia of the tissue.

Dr. C. Frank Bliven had obtained very favorable results with cocaine ; he had used it for the removal of a vital pulp in a root by injecting a small quantity of a twenty per cent. solution into the pulp after carefully working the point of the syringe into the canal, and was able to painlessly remove the pulp after three minutes.

Dr. Alcott stated that his experience with the use of cocaine had been very gratifying to him. He believed that the condition of the patient had much to do with its physiological action. In one case he had injected three minims of solution and extracted eight teeth with good results ; afterward, at a subsequent visit, he had injected the same quantity as before for the removal of a wisdom-tooth, but upon this occasion marked constitutional disturbance followed, which was expressed by faintness, nausea, cold perspiration, and clammy skin. The unfavorable symptoms disappeared after the use of stimulants.

He finds the application of a twenty per cent. solution to the pulp sufficient to enable him to effect its removal painlessly, but for this operation he applies the rubber-dam and dries the cavity before making the cocaine application.

In closing the discussion, Dr. Cutting called attention to a precaution which he deemed necessary, viz : that in the hypodermic use of cocaine, or any drug in fact, great care should be exercised not to inject air into the tissues with the solution.

Dr. E. J. Buck, of Warren, Mass., read a paper on "General Anesthesia."

The clinics were under the charge of Dr. L. D. Shepard, and were given by the following gentlemen :

Dr. George A. Young, Concord, N. H. Rapid gold filling.

Dr. W. R. Blackstone, Manchester, N. H. Gold filling, using soft and cohesive.

Dr. W. L. Roberts, Weymouth, Mass. Plastic gold filling.

Dr. B. C. Russell, Keene, N. H. Porcelain inlays.

Dr. G. F. Harwood, Worcester, Mass. Porcelain inlays.

Dr. A. DeCouagne, Fall River, Mass. Crowning teeth with living pulps.

Dr. P. T. O'Reilly, Holyoke, Mass. Bridge-work, showing practical cases in the mouth.

Dr. C. Frank Bliven, Worcester, Mass. Bending piano wire, also amalgam restorations.

Dr. C. A. Timme, New York. Enamel inlays ; no furnace required ; gas with Bunsen burner or alcohol lamp sufficient.

Dr. S. S. Stowell, Pittsfield, Mass. Porcelain crowns—original ; also short porcelain bridges.

Dr. J. F. Adams, Worcester, Mass. Use of the matrix in filling large buccal cavities.

Dr. C. H. Land, Detroit, Mich. Restorations, etc.

Under the head of "Dental Technics," Dr. L. D. Shepard said that he sold to his patients tooth-powder and floss silk, and thus insured their proper use. Dr. N. Morgan uses a simple water-heater consisting of a common porcelain mug having a quarter-inch hole in one side near the bottom to admit a gas tube plugged at the inner end, which reaches the middle of the mug and has a needle-point perforation on the top side to make it a gas-burner. In the opposite side of the mug is an inch hole for the supply of air. A common teacup for the water is set in the mug. He makes polishing disks of thin sections of round leather belting. Dr. G. A. Maxfield melts together two parts wax and one part tallow, stirring in fine emery to make "polishing cake," which is used on sand-paper disks, which thus are prevented from heating; and as the gold dust adheres to the disks, these may be sold for a considerable sum to the refiners. Dr. E. S. Gaylord indorsed the "polishing cake." Dr. G. E. Savage makes all his sand-paper disks from "English glass paper," and makes polishing wheels of rubber cloth. Dr. W. L. Roberts exhibited a little machine for making cotton pellets. Dr. P. T. O'Reilly makes gold collars, floored to fit the root end and cut away at the point, leaving the back high to burnish over the "diatoric" crown, which is thus held in place. When broken, another crown can readily be set in the collar and be secured by burnishing as jewelers set stones. Thus a bridge need not be removed for repairs.

To place the society right upon the record, the anti-patent resolution of October 22, 1869, was reaffirmed, in the belief that the code of ethics should be enforced by all dental associations.

PENNSYLVANIA STATE DENTAL SOCIETY.

THE following is a list of Standing Committees of the Pennsylvania State Dental Society:

Executive Committee.—Frank L. Bassett, Philadelphia; D. N. McQuillen, Philadelphia; P. K. Filbert, Pottsville; C. S. Beck, Wilkes-Barre; W. H. Fundenberg, Pittsburgh.

Publication Committee.—C. N. Peirce, Philadelphia; C. V. Kratzer, Reading; H. N. Young, Wilkes-Barre.

Enforcement of the Law.—L. Ashley Faught, Philadelphia; W. H. Fundenberg, Pittsburgh; Alonzo Boice, Philadelphia; J. C. Hamilton, Tyrone; C. P. Meaker, Carbondale; E. P. Kremer, Lebanon.

Legislative Action.—W. E. Magill, Erie; H. Gerhard, Lewisburg; G. W. Klump, Williamsport.

Clinic Committee.—P. K. Filbert, Pottsville; W. E. Van Orsdell, Sharon; W. H. Fundenberg, Pittsburgh.

L. JACK, *President.*

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-seventh annual meeting of the Missouri State Dental Association was held at Louisiana, Mo., July 7 to 10 inclusive. The following officers were elected for 1892: Dr. Geo. L. Shepard, president; Dr. E. E. Shattuck, vice-president; Dr. J. T. Fry, second vice-president; Dr. Wm. Conrad, corresponding secretary; Dr. W.

M. Carter, recording secretary; Dr. J. A. Price, treasurer; Drs. C. J. McBride, W. H. Buckley, DeC. Lindsley, board of censors; Drs. F. Slater, E. B. Crane, E. W. Bear, committee on ethics; Drs. E. E. Shattuck, W. S. Lowry, W. E. Tucker, publication committee; Dr. J. A. Price, committee on law; Dr. J. B. Vernon, committee on new appliances.

The next meeting will be held at Clinton, Mo., the first Tuesday after July 4, 1892.

WM. CONRAD, *Corresponding Secretary*,
St. Louis, Mo.

JOINT UNION CONVENTION OF NEW YORK DISTRICT SOCIETIES.

THE Fifth, Sixth, Seventh, and Eighth District Dental Societies of New York State will hold their sixth annual joint convention at the Iroquois Hotel, Buffalo, October 27, 28, and 29, 1891.

Of all the dental meetings held in this country, none are more profitable or more largely attended than these conventions, and the one this year promises to surpass all others in points of interest and attractiveness. Prominent men from New York and adjoining states and Canada have already signified their intention to be present.

An unusually interesting program of essays and clinics is being prepared; there will also be a special collection of abnormal and pathological specimens relating to dentistry, and a cordial invitation is extended to all dentists to attend the meeting and to contribute to the collection.

Special rates upon railways will be secured, and all arrangements for the comfort and convenience of those attending will be made.

For any information regarding the meeting, address the chairman of the committee, Dr. Charles S. Butler, 680 Main street, Buffalo, N. Y.

OHIO STATE DENTAL SOCIETY.

THE Ohio State Dental Society holds its next annual meeting in the city of Columbus, on Tuesday, Wednesday, and Thursday, December 1, 2, and 3, 1891.

No pains will be spared to make this in every way an attractive meeting, and a cordial invitation is extended to members of the profession throughout the country to be present. Ample accommodations and liberal inducements will be given for the exhibition and demonstration of new and useful appliances, instruments, etc.

The geographical situation of Columbus, and its extensive railroad connections, make it readily accessible from all directions. Arrangements have been made with the Central Traffic Association for reduced railroad rates on the certificate plan.

E. G. Betty, *President*, Cincinnati, O.
Otto Arnold, *Secretary*, Columbus, O.

NORTHERN ILLINOIS DENTAL SOCIETY.

The fifth annual meeting of the Northern Illinois Dental Society will be held at Elgin, Ill., Wednesday and Thursday, October 21 and 22, 1891.

The Executive Committee has prepared a good program, and extends a general invitation to all members of the profession to be present.

E. J. Perry, *Chairman Executive Committee*,
1212 Tacoma Building, Chicago, Ill.
T. W. Beckwith, *Secretary*, Sterling, Ill.

AMERICAN ACADEMY OF DENTAL SCIENCE.

The twenty-fourth annual meeting of the American Academy of Dental Science will be held in Boston on Wednesday, November 11, 1891, at 3 P.M.

The annual address will be delivered by George S. Allan, D.D.S., of New York.

E. N. Harris, *Secretary*,
248 Boylston street, Boston, Mass.

ALUMNI ASSOCIATION, NEW YORK COLLEGE OF DENTISTRY.

A meeting of the Alumni Association of the New York College of Dentistry will be held October 14, 1891, at the New York College of Dentistry, Twenty-third street, New York City.

Vincent M. Munier, D.D.S., *Secretary*.

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EDITORIAL.

THE EDUCATIONAL ASPECT OF DENTAL SOCIETIES.

That dental societies are, functionally, educational bodies needs no argument to secure its acceptance as a truism. The development of their usefulness and importance as factors of the body professional depends upon a recognition of this function, and whatever of advance is made in the details of society organization and their methods of work must necessarily take place in the light of such recognition.

The efforts from time to time being made by leading men to effect improvement in the character of dental society work, as evinced by formal publications upon the subject, motions embodying deviations from old methods, and recommendations to the same end in the majority of annual addresses recently made by presiding officers, all indicate, if not a pronounced dissatisfaction with former methods, at least a marked desire for changes which shall insure greater interest, better results, higher educational quality,—in short, develop the highest efficiency of the dental society as an educational power in all departments of dental science and art. It is not here intended to enter into a consideration of methods by which given educational results can best be accomplished, as to do so would involve an elaborate study and discussion of the details of society management, which after all are largely matters which each organization can best decide upon for itself in accordance with its special needs and in proper harmony with its aims and objects; but the present purpose is to call attention more particularly to some of the basal principles which determine the character and grade of work done and on which depend also the success or failure, in a broad sense, of the educational value of the society.

The last annual address of the president of the Maine Dental Society* contains a valuable historical *résumé* of dental societies from the organization of the first, which occurred about the year 1836, down to the present time; and a study of Dr. Bacon's address reveals, besides many interesting historical facts, a marked progress not only in the character and amount of work done, but what is equally important and significant, a similar evolutionary growth in the *esprit de corps* of the profession, as well as in its attitude toward society work.

The present position of mankind upon the subject of education in general is the result of a progressive growth whose rate of advance up to the beginning of the present century was so slow as scarcely to be noticeable, but which within recent years has increased with a rapidity that has wrought a complete revolution in thought as related to this subject. In earlier times the amount of knowledge possessed by the masses was comparatively slight; its sources were not accessible to them. Educational means were beyond their reach, and were monopolized by the favored few who used the power inherent in knowledge as a means for dominating and controlling their less fortunate neighbors. Education thus came to be a most potent factor in the establishment of social and caste distinctions. To the aristocrat belonged wealth and education, while the plebeian was devoid of both. So firmly and deeply rooted have these convictions become that it has been difficult for the average individual to regard the right to knowledge as a right inherent in personality, and therefore common to all humanity.

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* This address will appear in the November issue of the DENTAL COSMOS.

The revolution in thought upon this subject is, however, strongly marked ; not only do we have educational facilities open to all, under state and municipal supervision and control, but the recent organized efforts at popularizing education and bringing the sources of knowledge within practical reach of the masses of people of all grades of learning and intelligence are significant of still greater progress, and show that our old ideas as to the essentially aristocratic quality of knowledge are fast disappearing.

The change of thought as affecting educational matters is simply the working out of one of the factors of that general sociological evolutionary process which we term civilization. In the subject under consideration the relation of the general to the special is an intimate and vital one, and the spirit of progress which characterizes and has made possible the advance in existing educational methods has brought about a corresponding change in the educational character and functional activity of the dental society. The attitude of dental practitioners at and previous to the time when Hayden and his confrères labored for the formation of the first dental society in America seems almost inconceivable in comparison with the attitude of the profession upon the same questions to-day. Not only had they to overcome a stubborn apathy and indifference upon the part of dentists toward such a movement, but to combat a more formidable obstacle in the prevalent prejudice on the part of dentists to a community of knowledge.

The history of this early dental society contains a painful record of the bickerings of its members, growing out of their intolerance and prejudices, and inability to overcome the spirit of monopoly of dental knowledge which dominated many of them as individuals and which finally led to the dissolution of the society.

A half-century of professional growth has led to the almost complete extinction of this spirit, and has given place to one of greater liberality along educational lines, one more in harmony with the consensus of thought on these matters in general.

It is not sufficient, however, that we rest satisfied with having simply corrected one evil. Our clerical brethren assure us that "repentance is only one step in the direction of salvation." And having accepted the belief that the dental society is inherently an organization for the increase and diffusion of knowledge pertaining to dentistry, it becomes the duty of its members to persistently labor for its highest efficiency in these directions, to the end that its educational results may inure to the benefit of the greatest number.

A recognition of the function and object of dental societies here outlined should lead to especial care regarding the two vital elements in their work, viz : its quality and its dissemination.

The selection only of such papers as are of real value—those which in some degree add directly or indirectly to the sum total of dental knowledge—by a competent committee who will fearlessly reject such communications as do not meet these requirements, and the publication at once and as widely as possible through the dental periodicals of valuable proceedings, are matters of cardinal importance to the potential value and growth of dental societies when viewed in the light of educational factors. Such a view should effect, also, a minimizing of the political and business element in society work, which in too many instances has been permitted to dwarf the educational function of the society, a function which when exalted to anything like its theoretical limit should make the dental society the exponent of higher dental education in a sense somewhat analogous to that which the post-graduate schools and universities bear to the common schools.

THE CURRENT NUMBER.

THE large amount of additional matter which we present to our readers in the current issue of the DENTAL COSMOS, and the extra time and labor requisite for its preparation for the press, have occasioned the delay in its publication, for which we hope the increase of valuable material will fully compensate.

CORRECTION.

THE following communication has been received by us, and is self-explanatory. We cheerfully accord it the publication desired.

CHICAGO, Sept. 30, 1891.

TO THE EDITOR OF THE DENTAL COSMOS:

In the report of the proceedings of the National Association of Dental Examiners, in the September DENTAL COSMOS, on page 777 the Northwestern College of Dental Surgery is marked ("defunct"), and a star refers to a footnote which reads, "The diplomas of this college are discredited after 1889." This college is neither "*defunct*" *nor* "*discredited.*" Had the Illinois State Board of Dental Examiners been represented at Saratoga, this mistake would have been corrected. On the opposite page this college is correctly reported in the list of colleges of the Associated Faculties, giving number of matriculants, graduates, and per cent. The circulation of the DENTAL COSMOS in the profession is too extensive not to make this a very serious matter. As it is too late to correct the mistake before the beginning of the winter term, it will probably cause a decrease in the number of students and entail a heavy pecuniary loss; and its officers and faculty, as well as the students, have labored too hard and too long not to be injured by an attack of this nature on the reputation of this institution. Will you not, as a matter of simple justice, deny the report in your October issue, and make the correction as widespread and conspicuous as was the error itself? I send our current announcement to prove the fact of, and right to, existence. Very respectfully,

J. A. MARSHALL,
Secretary Northwestern College of Dental Surgery.

BIBLIOGRAPHICAL.

QUESTIONS AND ANSWERS ON DENTAL PATHOLOGY AND THERAPEUTICS, DENTAL EMBRYOLOGY, HYGIENE, AND CARE OF CHILDREN'S TEETH. By GUSTAVUS NORTH, A.M., D.D.S., Professor of Dental Pathology and Therapeutics, Dental Embryology, and Care of Children's Teeth in the American College of Dental Surgery, Chicago, Ill. 1891. Pp. 74. Price, cloth, $1.00.

This book contains "the outlines of the questions and answers of about fifty lectures delivered by the author" on the subjects included in the title. It is a special publication intended for the use of dental students, and while it may be useful as an aid in following the author's lectures, is of doubtful value in a general sense,—this entirely apart from the fact that much of its teaching is not in accord with generally accepted views, notably the negative views expressed upon gum-lancing in cases of difficult dentition of children, and the treatment of convulsions which at times arise in connection with these cases, by hot baths, on the assumption that cerebral hyperæmia is the cause, whereas a free, judicious use of the lancet at once removes the source of nervous irritation, which is the cause of both cerebral congestion and convulsions.

The author still adheres to the abandoned theory of Watt regarding the mineral-acid theory of decay; while the statement that "if the operator can distinguish temperaments, he can readily decide what filling-material will best preserve the patient's teeth," seems to involve an amount of intellectual penetration along this line which is not shared by the average dentist, to say the least.

OBITUARY.

DR. WILLIAM DEASON.

DIED, at his home in Mobile, Ala., July 26, 1891, of heart-failure, WILLIAM DEASON, D.D.S., in the seventy-fourth year of his age.

Dr. Deason was born in Lancaster District, S. C., March 27, 1818, and came to Alabama when a youth. About 1840 he began to study dentistry, and was licensed by the medical board of Alabama in 1845. He located at Uniontown, Ala., and held high position in society and profession till 1864, when he moved to Mobile, where he continued in practice till the day before his death. About 1865, in recognition of his skill as a dentist and ability as dental preceptor, he received the complimentary degree of D.D.S. from the Philadelphia Dental College.

He was a friend to struggling youth, and gave much timely aid to young professional aspirants.

He was the first president of the Alabama Dental Association, and at different times was offered professorships in colleges.

He was an unassuming, upright Christian gentleman, and by his death the profession has lost one of its staunchest members.

Dr. Deason was married in 1846 to Miss E. J. Gresham, who survives him with four children, all of whom are married.

DR. B. F. LINN.

Died, at St. Petersburg, Russia, July 3, 1891, of a complication of diseases, Benjamin F. Linn, D.D.S., in the thirty-eighth year of his age.

Dr. Linn was born in Philadelphia, Pa., in 1854. He studied dentistry at the Pennsylvania College of Dental Surgery, and graduated with high honors from that institution in the class of 1876.

Dr. Linn practiced in St. Petersburg for upward of ten years, where he had a large and lucrative practice, and was highly esteemed as an operator. He had the confidence and regard of a large circle of friends. His remains were cremated in Stockholm on the 26th of July.

DR. G. E. HERTZ.

Died, at Mahanoy City, Pa., September 16, 1891, of consumption caused by the grippe, George E. Hertz, D.D.S., in the thirty-fifth year of his age.

Dr. Hertz studied dentistry with Dr. W. H. Hertz, of Hazleton, Pa., and graduated at the dental department of the University of Pennsylvania in the class of 1880. He leaves a widow and one son.

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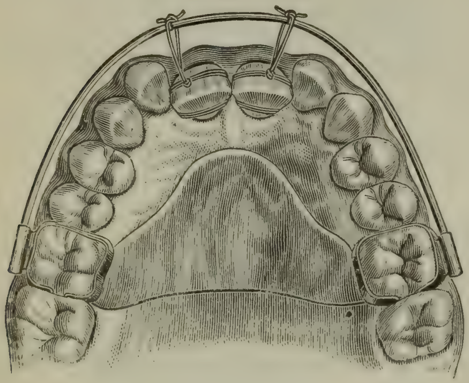
HINTS AND QUERIES.

A New Regulating Device.—The following contribution to the list of devices for correcting one of the more frequently occurring forms of dental irregularity may be found useful. I have obtained very satisfactory results with it in the two cases where I have used it. The object to be accomplished in both of these was to move the incisors outward for the purpose, in the first instance, of increasing the size of the upper arch, and in the second instance, where the upper central incisors closed inside of the lower incisors, of correcting this defect.

The appliance is constructed as follows: A broad clasp of platinized gold is thrown around each of the sixth-year molars, the opening of the clasp being at the distal buccal angle of the tooth or on its distal approximal surface. These clasps are yoked together by a narrow silver plate simply to give solidity to the fixture and cause the two molars to act as a single abutment. Upon the buccal aspects of each molar clasp is soldered a section of gold tubing about three-eighths of an inch in length ; the tubing used is the hinge-tubing of watch-case makers. The distal end of each tube is closed with a drop of gold solder. When the appliance is thus far completed, it is placed upon the model and a section of piano wire bent to conform to the arch, impinging upon the buccal aspect of the teeth about the middle of their crowns. The length of the piano-wire spring and the relation of its curvature to the labial aspects of the incisors is made such that its form will be that which the arch of the anterior teeth are to take and permanently retain, or, in other words, the wire is to be bent to the form of the arch which it is desired the teeth shall form when the correction is completed.



The wire will now have approximately a U shape. The free extremities of the wire are to be cut to the proper length, so that when introduced into the tube-sockets with the fixture in position in the mouth the arch of the U will stand nearly one-quarter of an inch anterior to the incisors and at about the middle of their crowns. After the fixture is adjusted in the mouth, the teeth to be moved outward are to be firmly ligated to the piano wire by means of fine gilling-twine or silk. The especial advantages of this fixture are that it is cleanly and easily removable for readjustment or cleansing. The traction force is exerted directly outward in the median line, or if desired its direction may be modified by tying the ligature to the wire on either side of the tooth to be moved. The amount of force exerted is absolutely under control, and may be modified at any time by changing the length of the legs of the U-shaped wire, or by using a wire of smaller diameter, or by the method of tying the ligature to the wire.

Not the least important advantage of the appliance as described is, that by having proper regard for the curve of the spring and length of its sides in relation to the curvature of the corrected arch, the fixture becomes practically automatic from the fact that the limit of resilience of the spring is reached at the moment the irregularity is corrected. Consequently, when the work of correction is done, the spring ceases to act. I have found much satisfaction in the use of electro-gilded piano wire, not only in the cases described, but wherever I have occasion to use piano wire in regulating teeth. The deposit of gold is amply sufficient to protect the wire from oxidation during a reasonable time while in use in the mouth, and the unsightly staining of the teeth by iron salts is thus avoided. The gold surface is also an advantage when it becomes necessary to unite lugs, loops, or other fixtures to it by means of solder.—EDWARD C. KIRK, D.D.S.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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ORIGINAL COMMUNICATIONS.

THE HUMAN MOUTH AS A FOCUS OF INFECTION.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

(Concluded from page 804.)

III. PROPHYLAXIS.

THE probability that one or more different species of pathogenic bacteria are constantly present in nearly every human mouth demands the strictest observance of antiseptic precautions in all operations upon the mouth or teeth.

Not only should all instruments, drinking-vessels, towels, napkins, etc., be kept scrupulously free from germs, but as far as possible the field to be operated upon should be freed from infectious material before the operation is begun.

This point I have discussed more at length in an article on the disinfection of dental and surgical instruments in the July number of the DENTAL COSMOS.

The question to which I here wish to call particular attention concerns the measures which should be taken to prevent the undue growth of bacteria, pathogenic as well as non-pathogenic, in the mouth, the ultimate object being not alone to limit as far as possible the action of micro-organisms and their products upon the teeth, but to keep within bounds as well the various diseases which we have seen may result from a lack of proper care of the mouth. It is not necessary to call attention to the fact that a great deal may be accomplished toward freeing the mouth of micro-organisms by the proper use of the tooth-brush, toothpick, floss silk, etc. But even a very thorough mechanical cleaning still leaves hordes of bacteria in the mouth. Besides, there are many conditions under which the brush cannot be used, and but a small minority of the human race understand how to use a brush or seem capable of even learning how. Even those who give the most attention to their teeth and brush them regularly once a day, which is considered a great deal, very seldom succeed in bringing the brush into contact with the third or even the second molars. The dentist accordingly should not fail to furnish his patients with the necessary directions as to how to use the brush and other means employed in cleansing the teeth. The task of finding an antiseptic with an agreeable taste and smell which is sufficiently powerful and rapid in its action to devitalize any considerable number of bacteria during the few moments that it may be kept in the mouth, without at the same time exerting any deleterious action upon the mucous membrane of the mouth or upon the teeth or even upon the general health, is one of the most difficult with which we have to deal in the hygiene of the mouth. Not one of the many mouth-washes with which the market is flooded makes even an approach toward accomplishing this end. For the purpose of disinfecting the mouth in cases of acute diseases, stomatitis, diphtheria, gangrene of the mouth, etc., physicians usually have recourse to borax, boracic acid, chlorate of potash, permanganate of potash, lime-water, salicylic acid, etc., which, with the single exception of salicylic acid, have next to no action whatever upon the bacteria of the mouth, though some of them undoubtedly have an excellent cleansing action upon inflamed or suppurating surfaces by virtue of which their use may be attended with very beneficial results.

Methods of Determining the Action of Antiseptic Solutions in the Mouth.

In order to arrive at results of the greatest practical value, it is necessary to test the action of the solution upon the bacteria in the mouth itself and not upon pure cultures of bacteria in bouillon. The latter method, while it allows us to determine with great precision the comparative action of various antiseptics, gives results which are too favorable to the antiseptic.

I found, for example, that a mixture of sublimate and benzoic acid, which completely sterilized a pure culture of streptococci in one minute, required at least five times as long to sterilize an equal quantity of saliva. In the experiments to be recorded below, I have employed three different methods.

I.

The mouth being rinsed for about ten seconds with the antiseptic in suitable strength, the latter is evacuated into a sterilized glass vessel, and at definite intervals drops are conveyed on a sterilized platinum needle to tubes of bouillon which are labeled and put into the incubator.

If the tubes, or some of them, become cloudy in twenty-four to sixty hours, we have evidence that the sterilization of the mouth-washings had not been accomplished in the time indicated by the labels on the respective tubes.

The strength in which antiseptics may be used in the mouth was found to be as follows for the substances experimented with :

1. Sublimate, 1 : 2000.
2. Trichloride of iodine, 1 : 2000—1 : 1500.
3. Benzoic acid, 1 : 300—1 : 200.
4. Salicylic acid, 1 : 300—1 : 250.
5. Hydronaphthol, 1 : 1500.
6. β naphthol, 1 : 1500.
7. Lysol, 1 : 200.
8. Carbolic acid, 1 : 100.
9. Boric acid, 1 : 50.
10. Zinc sulphocarbolate, 1 : 250.
11. Liq. alumin. acet., 1 : 20.
12. Thymol, 1 : 2000.
13. Alum. acet. tartar., 1 : 60.
14. Peroxide of hydrogen, 2–4 : 100.
15. Thallinum sulphur., 1 : 1000.
16. Saccharine, 1 : 400.
17. Soluble saccharine, 1 : 120.
18. Oil of eucalyptus, 1 : 625.
19. Eugenol, 1 : 750.
20. Oil of cinnamon, 1 : 400.
21. Oil of cloves, 1 : 550.
22. Oil of latch, 1 : 360.
23. Oil of wintergreen, 1 : 350.
24. Oil of peppermint, 1 : 600.
25. Chlorate of potash, 1 : 40.
26. Permanganate of potash, 1 : 2500.

Bichloride of mercury (eight tests) effected a marked diminution in the number of germs in one minute ; the complete sterilization, however, required, on an average, over five minutes. The efficacy of the sublimate was increased to a surprising degree by the addition of benzoic acid.

Trichloride of iodine (seven tests) required an average time of about one and a quarter minutes, proving to be decidedly superior to the bichloride ; it is furthermore far less disagreeable than the latter, in fact not at all disagreeable ; it has, however, most unfortunately, an acid reaction, and is therefore not suited for daily use as a mouthwash. In the strength of 1 to 1500 (one test) the sterilization was accomplished in forty seconds.

Benzoic acid (four tests) required 2 to 2½ minutes' time.

Salicylic acid (two tests) required ¾ to 1 minutes' time.

Hydronaphthol (two tests) required over* 15 minutes' time.

β naphthol (one test) required over 10 minutes' time.

Lysol (four tests) required over 5 minutes' time.

Carbolic acid (one test) required over 5 minutes' time.

Boric acid (one test) required over 11 minutes' time.

Zinc sulphocarbolate (one test) required over 7½ minutes' time.

Liq. alum. acet. (one test) required over 5 minutes' time.

Alum. acet. tartar (one test) required over 5 minutes' time.

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* By over fifteen minutes, over five minutes, etc., I do not mean *just* over, but *something* over ; thus, over five minutes may be six and it may be sixty minutes. Over five therefore means that the antiseptic was kept under the test for five minutes, and found at the end of this time not to have effected the sterilization.

Thymol (one test) required over 5½ minutes' time.

Peroxide of hydrogen (three tests) required over 6 minutes' time.

Thallinum sulphur. required over 6½ minutes' time.

Saccharine (1 part sat. alcoholic solution to 10 water) required ¾ to 1 minute's time.

Saccharine, sat. aqu. sol., required over 10 minutes' time.

Soluble saccharine required over 5 minutes' time.

The slight action of the aqueous solution of saccharine compared with that of the alcoholic solution is accounted for by the slight solubility of saccharine in water.

Oil of eucalyptus (one test) required over 8 minutes' time.

Eugenol (two tests) required over 10 minutes' time.

Oil of cinnamon (two tests) required over 8 minutes' time.

Oil of cloves (two tests) required over 11 minutes' time.

Oil of latch (two tests) required over 19 minutes' time.

Oil of wintergreen (two tests) required over 12 minutes' time.

Oil of peppermint (two tests) required over 11 minutes' time.

Oil of cassia (two tests) required over 30 minutes' time.

Eau de Bôtot (four tests) required over 15 minutes' time.

Eau de Pierre (three tests) required over 11½ minutes' time.

An examination of the above results will soon convince us that there are very few substances at present in the dental materia medica which are available for disinfecting the human mouth.

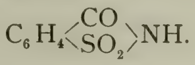
The bichloride of mercury is much restricted in general use by its exceedingly disagreeable taste and by the possibility of a deleterious action upon the health when used daily for a length of time. The trichloride of iodine is hampered by its acid reaction, which restricts its use to acute infectious diseases of the mouth or throat. Salicylic acid labors under a similar ban.

We have accordingly only saccharine and benzoic acid left from which to construct antiseptic mouth-washes *for daily use*, since a substance which requires over five minutes to devitalize bacteria cannot be expected to accomplish much in the short time during which a mouth-wash is kept in the mouth. We may make an exception, however, in favor of the peroxide of hydrogen, which on account of its non-poisonous and non-irritant character may be used more frequently and kept longer in the mouth than the great majority of other antiseptic liquids.

A mouth-wash which I recommended years ago, and which is decidedly superior to the best of the many so-called antiseptic mouth-washes on the market, has the following construction :

℞—Acid. benzoic., 3.0 ;
Tinct. eucalypti, 15.0 ;
Alcohol, 100.0 ;
Ol. menth. pip., 0.75.

For the last year I have been making experiments with saccharine, which manifests a very considerable action upon the bacteria of the mouth. It appears also to be one of the least poisonous of the substances recommended for the treatment of the oral cavity, and has no deleterious action upon the teeth. Its greatest drawback is its intense sweetness, which to some persons renders it very unpleasant. It is not, however, the sweetness of sugar, saccharine not belonging at all to the sugars or even to the carbohydrates, being chemically an anhydride of a sulfobenzoic acid,



$$C_6H_4\left\langle\begin{matrix}CO\\SO_2\end{matrix}\right\rangle NH.$$

I have employed it in the following form :

℞—Saccharini, 2.5 ;
Acid. benzoic., 3.0 ;
Tinct. ratantiæ, 15.0 ;
Alcohol. abs., 100.0 ;
Ol. menth. pip., 0.50 ;
Ol. cinnam., 0.50.

Three parts of this to twenty-seven parts of water kept in the mouth a full minute has a very marked effect upon the number of living bacteria in the mouth. If instead of water we use a four per cent. solution of peroxide of hydrogen in connection with the tincture, we obtain a still more striking result, as seen in Nos. 14–17 of the table given below.

II.

In order to determine whether or to what degree an actual reduction of the number of bacteria present in the mouth can be effected by the use of an antiseptic wash independent of its mechanical action, a method of experimentation somewhat different from the one described above had to be devised.

The mouth was carefully rinsed with the solution to be tested, keeping it in the mouth just one minute, the rinsing movements being carried out three times every five seconds. Fifteen minutes later the mouth was again rinsed in exactly the same manner with 30 cc. sterilized water. Of this water, 1 cc. was added to a liter of sterilized water, thoroughly shaken up, and one drop of it brought into a tube of melted agar-agar which was poured on a Petri plate. After two or three days the number of colonies which developed were counted.

On the following day at the same hour the so-called control experiment was made, *i.e.* the same operations were repeated, using pure water in place of the antiseptic for the first rinsing. Any marked or constant difference in the number of colonies which develop is to be attributed to the action of the only factor which is present in the first and not in the second, *i.e.* the antiseptic.

The following results were obtained :

Antiseptic.	No. of colonies.	No. of colonies in control experiment.
1. Saccharine, benzoic acid mouth-wash ...	47	198
2. “ “ “	82	170
3. “ “ “	51	277
4. “ “ “	58	270
5. “ “ “	63	197
6. “ “ “	50	150
7. “ “ “	35	175
8. “ “ “	51	825
9. “ “ “	14	720
10. “ “ “	49	750
11. 10% peroxide of hydrogen, followed by mouth-wash	12	525
12. “ “ “	6	82
13. “ “ “	4	not made
14. Mouth-wash in 5% of H_2O_2	14	not made
15. “ “ “	2	345
16. “ “ “	62	421
16 *a* “ “ “	31	851
17. “ “ “	5	not made
18. Sublimate benzoic acid mouth-wash	12	not made
19. “ “ “	8	not made
20. “ “ “	2	179
21. Eau de Botôt...........................	120	not made
22. “ “	275	not made
23. “ “	280	not made

The striking and constant difference in the numbers bears sufficient evidence of the efficiency of the antiseptic. In the first seven experiments 20 cc. were used, in the last three 30 cc., which may account for the fact that the latter turned out more favorably for the antiseptic.

One factor which renders the sterilization of the mouth so difficult, is the constant presence of fat, which prevents the antiseptic from readily penetrating small particles of food, as well as from coming directly into contact with the teeth. In the hope of rendering the bacteria more accessible to the antiseptic, I first rinsed the mouth slightly with a ten per cent. solution of peroxide of hydrogen, following it up with the mouth-wash. In other cases again I used the five per cent. solution of peroxide of hydrogen instead of water in preparing the mouth-wash.

The results given in the table 11–17 seem certainly to indicate that the action of the wash is intensified by the addition of the peroxide.

Experiments with the sublimate benzoic acid mouth-wash (the first formula given above, with addition of 0.75 sublimate) resulted very favorably, as seen in the table (tests 18–20).

The celebrated mouth-wash Eau de Botôt, as expected, gave anything but favorable results (tests 21–23).

III.

The action of antiseptic mouth-washes upon the pathogenic bacteria in the mouth was tested in the following manner: One or two drops of saliva intermixed with mucus and epithelium being secured from the mouth of any person in whom it had been found to be fatal to mice in twelve to twenty-four hours, the person rinses his mouth thoroughly with the mouth-wash, and, after waiting fifteen minutes, again produces a small quantity of saliva as before. One to two drops of each sample, the one taken before, the other after rinsing, are injected into the abdominal cavity of white mice. Any marked action of the antiseptic upon the pathogenic bacteria in the mouth would manifest itself in the later death of the mouse injected with the second sample.

In some fifteen tests made in this manner, with the saccharine mouth-wash either alone or in combination with the peroxide of hydrogen, there was not a single case in which sputum septicæmia occurred, although the control mouse died invariably of this disease in fifteen to thirty-six hours. From these results we must infer that this mouth-wash furnishes a very valuable means of combating the micrococcus of Sputum septicæmia (or of croupous pneumonia) in the human mouth. The wash failed, however, to produce the desired action upon the pyogenic bacteria of the mouth, as well as upon the bacillus of Sputum septicæmia; the death of the animal injected with saliva containing these bacteria being retarded but not prevented.

MOUTH-BREATHING NOT THE CAUSE OF CONTRACTED JAWS AND HIGH VAULTS.

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(Read before the American Dental Association, Saratoga Springs, N. Y., August 4, 1891.)

MOUTH-BREATHING was unknown among the early races, and is not observed in the present modern, uncivilized pure races. This may also be said of deformities of the maxillæ and teeth. It will be admitted, however, that mouth-breathing and also irregularities of the jaws and teeth are becoming very frequent among our own people, and it is a reasonable supposition that the causes which would produce the one condition must necessarily in many cases produce the other.

In an otherwise logical essay upon the subject of "The Influence of Adenoid Hypertrophy at the Vault of the Pharynx upon the Development of the Hard Palate," read before the New York Odontological Society, November 16, 1890, by Dr. D. Bryson Delavan, the author speaks of mouth-breathing as a cause. He says, "The mouth-breathing habit compels the constant dropping of the lower jaw, which, hanging by the cheek from the superior maxilla, causes constant pressure upon the upper jaw. This produces flattening of the lateral alveolar arches and shortening of them, in consequence of which there is not sufficient space for the eruption of the canines when they are due, and they therefore grow forward."

Other authors mention the fact that sleeping with the mouth open produces tension of the buccinator muscle, this causing the jaws to contract ; and they suggest different ingenious but sophistical theories to explain how this pressure may bring about the peculiar form of deformity. There are also very able specialists, teachers in our medical colleges, who are constantly bringing this theory before the students as a cause. Such instruction has a tendency to defeat scientific investigation as to the real causes of the true condition found in obstructions of the nasal passages by assuming as the cause the apparent fact, namely, mouth-breathing. Students thus take it for granted that mouth-breathing is the cause, and the only cause, for this condition.

I will therefore direct attention to a few facts as they have been presented to me during a constant study of the deformities of the jaws and teeth for the past fourteen years.

In the first place, let us consider the parts involved. The superior maxillary bones are fused at the median line. Their under surfaces have imposed upon them the alveolar processes. Gray speaks of these two structures as one bone,—the superior maxillary bone ; but from the function, structure, and position of the alveolar process in its relation to the maxillary bone proper, they should be separately described as distinct bones. The maxillary bones proper are made up of dense, compact tissue, and are so arranged as to best resist certain forces. The outer surface of the bone is fortified and supported by the malar process, which is situated midway between the maxillary process and the canine eminence at the first permanent molar. At the canine eminence we have the strong, thick plate of bone extending from the bridge of the nose to the alæ, the mesial portion forming the outer surface of the nasal cavity. We also observe that the nasal septum is situated at the center of the nares and is attached to the maxillary bone at and along the place of union of the two halves of the maxillary bone. A saw passed through from one canine fossa to the other discloses in the section the strong trilateral pillars of bone which go to make up the outer surfaces of the nasal cavity. These strong pillars of bone are situated just at the point of the location of the permanent cuspids, and together with the nasal septum form a strong support to the hard palate.

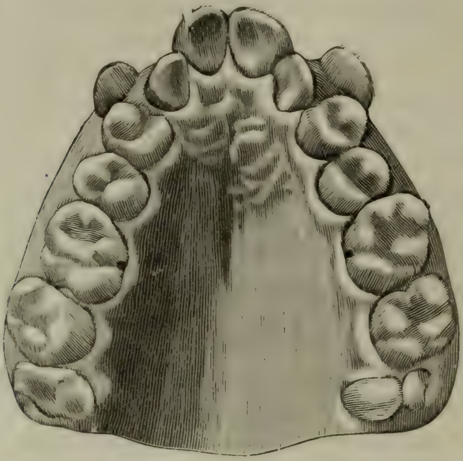
The maxillary bones are for the attachment of muscles and the resistance of force in masticating food. The hard palate does not assume the normal shape until the twelfth year, or after the teeth are all in position. The vault may be high or low, ranging from one inch vertically from the alveolar plane on a transverse line intersecting the alveolar crests between the second bicuspids and first molars (which is the highest vault I have seen) down to one-quarter of an inch from the same plane, which is the lowest vault I have observed. In either case it may be normal, each variety depending upon the shape of the bones of the head for its peculiar form.

The alveolar process, on the other hand, is made up of soft cancellated structure, and is solely for the purpose of protecting the germs of the teeth before they have erupted, and for supporting the teeth after they are in place in the jaw. From the time the teeth make their first appearance until they are finally shed, the alveolar process has developed and been absorbed three distinct times. The alveolar process being therefore solely for the protection and support of the teeth, it is logical to infer that the position and shape of the alveolar process depend upon the location of the teeth. The bone proper, therefore, as we shall see later, is not influenced to any great extent by the movement of the teeth.

The buccinator muscle is composed of striated muscular fibers, and is therefore under the control of the will. It is penniform in shape. It has its origin and insertion along the body of the jaws, above the alveolar process on the upper and below the alveolar process on the lower jaw. It extends from the first bicuspid anteriorly to the wisdom-tooth posteriorly. The center of the muscle in one direction therefore would be on a line with the grinding-surface of the teeth, and in a transverse direction at the first permanent molar. It serves to compress air in the act of blowing, whence its name. Its chief function is to convey and hold the food under the teeth during mastication.

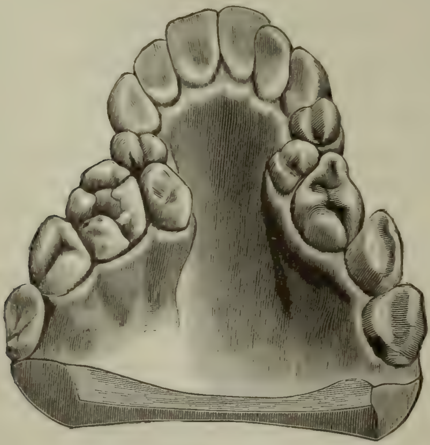
There are many cases of contracted arches where mouth-breathing does not exist; there are also many cases of normal arches where it is present. As many are aware, mouth-breathing frequently commences very early in life; contracted jaws, on the other hand, never begin to form until the seventh or eighth, and in most cases the tenth year, except in cases of monstrosities, or from traumatic causes. When these conditions exist, they are wholly unlike the usual contracted arches and can be diagnosticated at once, and therefore they should not enter into this discussion. Contracted arches are of two kinds, V- (Fig. 1) and saddle-shaped (Fig. 2), all the other varieties being modifications and blendings of these two. It is apparent that the cause which produces the one does not produce the other. My observation has been that there are two-thirds more V- and saddle-shaped arches among the low vaults than among the high vaults, taking .58 of an inch as the average; but where one of these deformities exists with a high vault it is always more marked, for the reason that in the high vault the alveolar process is long and thin, with very little resistance, and the teeth are more easily carried in one direction or the other.

FIG. 1.



In the V-shaped arch, commencing at the first permanent molar, there is a gradual narrowing of the teeth-occupancy and alveolar process toward the median line, where the incisors may approximate a V point or may stand in their normal position to each other. Invariably there is a protrusion of the teeth and alveolar process, and not of the jaw. On the other hand, in the saddle-shaped arch the

FIG. 2.



bicuspids are carried inward and the deformity is invariably situated between the first permanent molar and the cuspid. Unlike the V-shaped variety, the anterior teeth and alveolar process never protrude in this class of deformities. The contracted hard palate is always associated with the V-shaped variety, and in most cases extends backward to the second bicuspid. It is never seen with the saddle-shaped variety.

The high vault is never seen in the first set of teeth, nor does it develop until the second set are all in place, which is at the twelfth year. The vault commences to slope slightly from the neck of the incisor until it reaches an imaginary line drawn across the roof of the mouth from the right first bicuspid to the left first bicuspid, and then it gradually or abruptly slopes upward until a point is reached which is central and vertical to a line drawn across the jaw from crest to crest between the second bicuspids and first molars. From this point posteriorly to the soft palate the dome is usually nearly level and parallel with the plane of the alveolar crests of the bicuspids and molars. Occasionally we see a slight relative depression and occasionally a corresponding slight elevation, but these are so inconsiderable as to escape notice unless one were looking for the peculiarity.

In mouth-breathing the lower jaw usually drops only sufficiently for the passage of the same volume of air that would pass through the nasal cavities, each of the openings to which is equal to only about one-half an inch in transverse area. Old people often sleep with the mouth open and frequently to the fullest extent, but these deformities of the jaws and teeth never occur after the eruption of the teeth, say at the twelfth or fifteenth year.

When one opens his mouth he is conscious of a tension of the orbicularis oris, but not of a pressure of the buccinator, no matter how wide the mouth may be opened. This muscle being under the control of the will, is always passive except in the act of blowing or eating; therefore contraction during sleep is wholly out of the question. As the buccinator muscle extends anteriorly to the first bicuspid only, it cannot be productive of the V-shaped variety of deformity, in which is also found the contracted vault. Therefore the only deformity that is likely to be so produced is the saddle-shaped variety, which is, in fact, out of the question for reasons which I shall explain later. The orbicularis oris muscle cannot produce the contraction, because when the mouth is open the pressure exerted on the six anterior teeth is backward. Thus the teeth should be carried in the opposite direction from that which must be taken to produce this deformity. Again, the pressure is just as great upon the incisors as upon the cuspids, thus holding them in place. More force is exerted by the orbicularis oris upon the six anterior teeth when the mouth is open than could be exerted, were it possible, by the buccinator muscle, which would tend to hold the anterior teeth in place. It has in years past been demonstrated by dentists in regulating teeth that it is very rare for the apices of the roots of teeth to move when pressure is brought to bear upon their crowns for the purpose of regulating them. This being the case, teeth having long roots like the cuspids are less liable to move than teeth with short roots like the lateral incisors and bicuspids. Since in the moving of a tooth the greatest change which takes place is at the neck, it stands to reason that the greatest absorption and deposition of bone takes place at that point. The roots of the cuspids are larger and longer than those of any other teeth in the jaw ; unlike other teeth, the germs are situated considerably higher and farther toward the outside of the alveolar process, so that when they come closely into position they diverge from the apices to the crowns, while all the other teeth stand nearly or quite perpendicular, thus showing that the roots of these teeth do not influence the hard palate. I have shown that the first permanent molar and the teeth posterior to it are never involved. I have also shown that the center of the buccinator muscle in both directions is located at this tooth. How, then, is it possible, since all the teeth are covered by the muscle upon one side, that half are carried inward and the other half remain normal? Again, if mouth-breathing is the cause of the contraction, both sides should contract alike, and the deformity would be uniform upon both sides, which is never the case. Such muscles do not contract to a degree sufficient to induce the pressure necessary to produce a deformity. That they should, is inconsistent with our knowledge of the influence exerted by muscular structure in other parts of the body. Some of the muscles of the chest exert much more pressure in respiration than it is possible for the buccinator to do during sleep, yet no one would expect to find the ribs modified by this process. The pressure of the contractile tissue upon the crowns of teeth is not sufficient to affect the alveolar process through the roots of the teeth, but even if it could modify that spongy structure, its force would stop there and would not extend to the osseous vault and result in bending it out of shape. In most of these cases the diameter of the superior maxilla, its alveolar process and teeth, is less than that of the inferior maxilla, alveolar process, and teeth. This is always the case in the worst forms of irregularities. In such cases the muscles and cheek could not press upon the teeth and alveolar processes of the upper jaw. The changes which take place in the bone are not a bending in at one place and a forcing out at a weaker point to compensate for the space lost, but are an absorption and deposition of bone at the point of pressure. And even if such were the case, the strong pillar of bone situated at the very point of contraction of the alveolar process, together with the nasal septum, constitute a strong bulwark for resistance to the pressure which is suppositiously acting at quite a distance from the top of the vault. Again, it would be as impossible to so produce pressure sufficient to break the dental arch as it would be for the weight of a building to break the arch of a door or window. The tongue exerts a much greater force in the act of swallowing, and would prevent the inward movement of the teeth if so slight a pressure as the muscles of the cheeks could exert were really the cause of the deformity. For the sake of the argument, let us suppose it were possible for the buccinator muscle to produce this contraction ; we should then expect to find the modification of the osseous structures uniform. This would shut out semi-V-shaped (Fig. 3) and semi-saddle-shaped

FIG. 3.

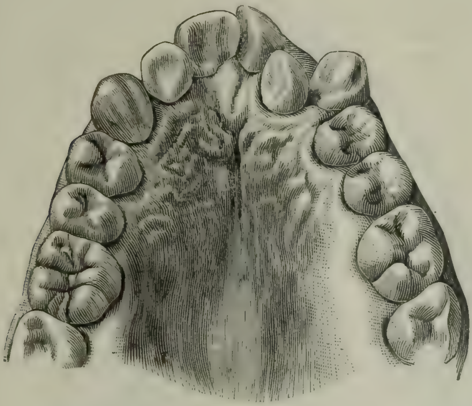
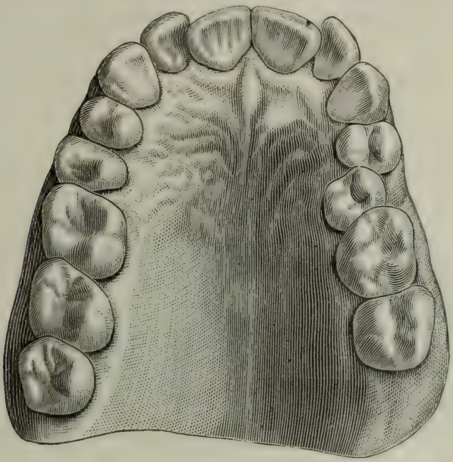


FIG. 4.



arches (Fig. 4) entirely, and a majority of other irregularities of the teeth in which there is bilateral asymmetry, for however much one might incline to the prevalent theory, no one would dare to assert that the muscle will act on one side of the mouth, while that on the opposite side remains passive. Partial V-shaped (Fig. 5) and partial saddle-shaped (Fig. 6) arches make the theory still less tenable. In these varieties we meet with sudden bends inward where only one or two teeth may be involved, which aberrations could only be produced by a centralization of force on one given point or fiber of muscle, a peculiarity of function that has never yet been ascribed to muscles. The muscle being penniform in shape, it would be impossible for one or two fibers of the muscle to exert their influence upon a bicuspid. It would naturally lap over two or more teeth. Lastly, if

FIG. 5.

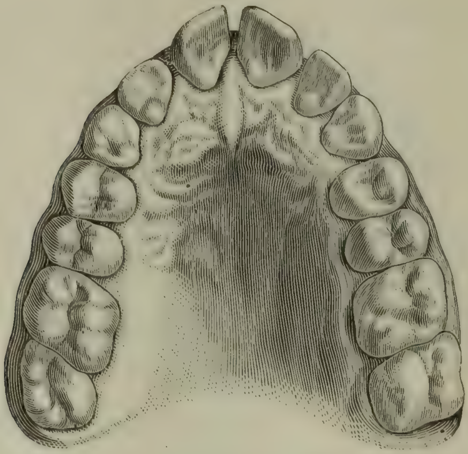
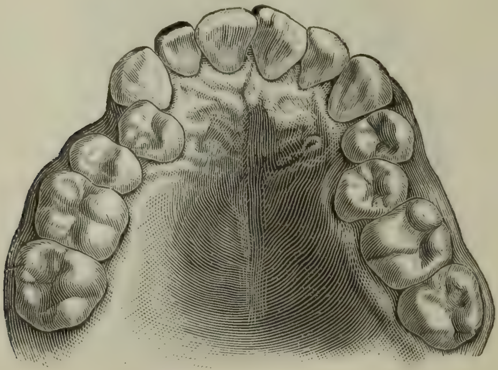


FIG. 6.

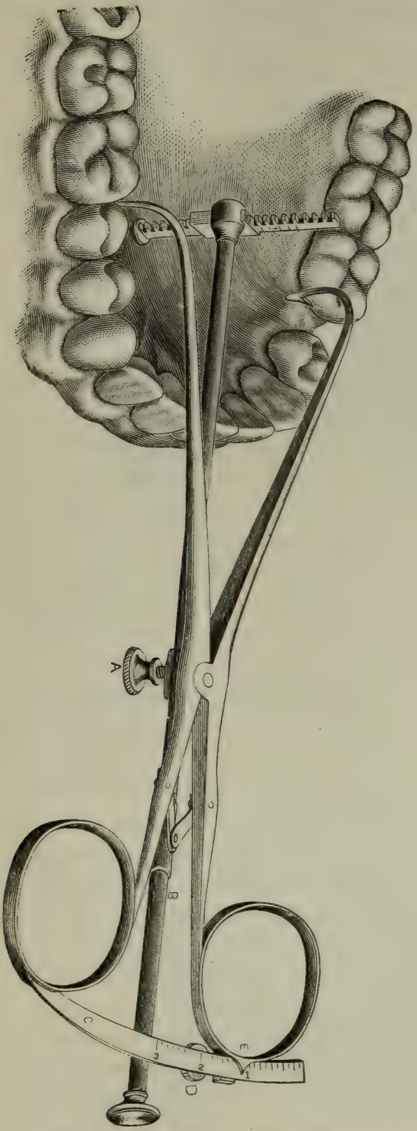


the buccinator acts as all muscles do, uniformly throughout its extent of contraction, it is just as efficient below a median bisecting line in producing a narrow, contracted arch as in its upper portion, and we should therefore expect to find the lower maxilla contracted whenever the upper one is, which is contrary to facts. A V-shaped arch can never occur upon the lower jaw, if the teeth articulate normally, because these teeth strike inside of the upper, and are thus prevented from moving forward. A saddle, partial saddle, or semi-saddle arch may occur on the lower jaw, but these deformities are not often seen. When they do occur, they are the result of improper occlusion with the teeth of the upper jaw. We always observe in semi-V and partial V-shaped arches that the alveolar process is contracted upon the side of the deformity. If one side of the arch is contracted more than the other, we shall see that the alveolar process is contracted in proportion to the amount of deformity ; the vault on that side is not carried up beyond the other side, which is normal. In the saddle, semi-saddle, and partially saddle-shaped arches we find the alveolar process built up about the teeth in precise conformity to the nature of the shape of the arch. If we take three thousand models of the upper jaw and arrange them in groups according to the forms here represented, and then examine very closely the arrangement of the teeth in each group, we shall be unable to find any two alike in either group ; thus showing that an external force acting upon the jaws from the outside could not possibly be a cause. If that were possible, all the models of one variety would resemble some definite form.

Dr. Delavan says that "the prominence of the anterior region of the alveolar arch is still further increased by the projection forward of the superior maxilla at this point and of the upper teeth." This author is quite mistaken regarding the "projection forward of the superior maxilla." The maxillary bone never protrudes in front in this class of cases ; it is only the alveolar process which is carried forward by the projecting teeth. The only tissues involved in these deformities are the teeth on the one hand and the alveolar process on the other.

In most cases the cause of these deformities is an arrest of the development of the maxillary bone. This condition is due not only to hereditary influence, but also to direct causes, such as the eruptive fevers and all lesions which are constitutional and which produce long sickness. When arrest of development of the superior maxilla takes place, we always notice a depression at the alæ nasi and a sunken condition of the bones of the face on the line drawn from ear to ear, and the abnormality occasionally extends up to the floor of the orbit. If we examine closely the faces of an audience in Chicago, we shall observe that from forty to fifty per cent. of all these people have this arrest of development of the superior maxilla. Such being the case, the arrest of development must necessarily extend to the bones of the nose, thus producing mouth-breathing. Ziem has frequently shown that if one nostril of a rabbit be permanently closed and the animal killed after it has attained its full growth, the nasal cavity of the affected side will be found to be undeveloped and asymmetry of the face will have taken place. Arrest of development of the bones of the nose, and hypertrophy of the bones and mucous membrane, are concomitants. A good illustration of hypertrophy of mucous membrane from want of use is observed by dentists when gums puff up, thicken, and extend one-half to three-fourths of the length of the teeth from lack of brushing. It would be absurd for anyone to say that mouth-breathing is the cause of one case of V-shaped arch in every twenty, and that some other cause produced the rest of the deformities. We must have a law which will work in all varieties of contracted arches as well as the V-shaped, which variety constitutes a very small percentage of the whole. I have watched the development of these different varieties for the past fourteen years, have taken impressions of the mouths of some of the most marked cases every three months, and have compared them. I have also produced most of these different typical forms of irregularities during the movement of the teeth for the purpose of correcting deformities.

FIG. 7.



Having, then, discovered that the arrest of the development of the maxillary bones is the cause of contracted jaws and irregularities of the teeth, have we not a good foundation to work upon to discover the cause of deflected septum and of mouth-breathing?

The following tables will exhibit the differences in the heights of vaults, both in normal and defective jaws. The height is taken centrally and vertically from the gingival plane on a transverse line intersecting the gingival crests between the second bicuspids and first molars. For comparison with measurements of denuded crania, deduct .07 for the thickness of the soft tissues. Fig. 7 shows the instrument used, and the manner of making the measurements.

NORMAL JAW.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21	1	.40	159	.56	936	.71	149
.25	2	.43	182	.59	218	.75	427
.28	70	.46	69	.62	514	.78	69
.31	171	.50	199	.65	150	.81	75
.34	169	.53	429	.68	568	.84	12
.37	146						

Total number of cases, 4614. Average, .58 of an inch.

SADDLE-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40		.56	6	.71	5
.25		.43		.59	5	.75	5
.28		.46	3	.62	4	.78	1
.31		.50	5	.65		.81	1
.34		.53	5	.68	3	.84	
.37	1						

Total number of cases, 44. Average, .60 of an inch.

V-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40	1	.56	15	.71	1
.25		.43		.59	4	.75	2
.28		.46	3	.62	9	.78	
.31	2	.50	8	.65		.81	1
.34		.53	3	.68	5	.84	
.37	4						

Total number of cases, 58. Average, .55 of an inch.

SEMI-V- AND SEMI-SADDLE-SHAPED ARCH.

Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.	Height of Vault.	No. of Cases.
.21		.40		.59	1	.75	
.25	1	.43	1	.62	4	.78	1
.28		.46		.65	2	.81	
.31		.50	3	.68		.84	
.34		.53	3	.71	2		
.37	1	.56	5				

Total number of cases, 24. Average, .56 of an inch.

It seems, then, that what has been considered a change in the height of the vault in narrow and contracted jaws is only an imaginary one, the contraction conveying the impression that the vault is much higher than it really is.

The height of the vault which is normal depends upon the general shape of the cranium.

In order to strengthen further the views herein suggested, I have taken impressions of the mouths of a large number of mouth-breathers and have secured models of the same.

The following illustrations are from models of the mouths of patients over twelve years of age. They number from 1 to 24, in the order in which the impressions were taken. A sufficient number of cases are here illustrated to show the general outline of the jaws and teeth of the average mouth-breather.

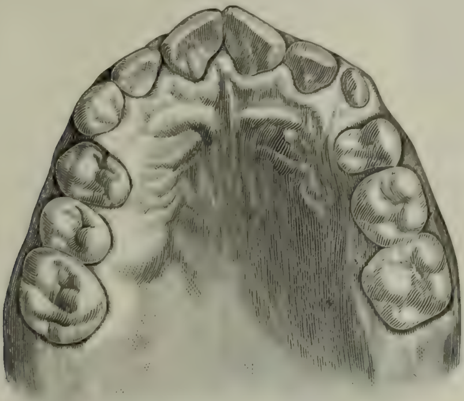
In glancing over these illustrations (which are of natural size) it will be noticed that very few have contracted arches ; as a rule, the vaults are less than the average in height. It will also be observed that no two cases are exactly alike, which would be the case if the contracted jaws were caused by lateral pressure of the cheeks.

I wish here to acknowledge my grateful obligations to Drs. Hawley, Brown, and Pyncheon, specialists in diseases of the nose and throat, for their kindness in sending me their private patients.

Case 1.—Fig. 8. Hector M., age thirteen years ; nationality, French ; born in Chicago. Height of vault, .53 of an inch. Has always breathed through his mouth. Adenoid growth in post-nasal spaces. Collapsed condition of alæ nasi.

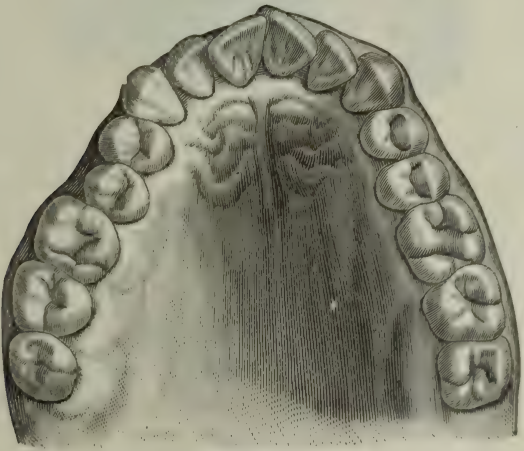
Upon examining this cut we shall observe that although the patient is thirteen years of age, the teeth are late in erupting. The bicuspids are all through upon the right side and the cuspid is just coming into place, while upon the left side the second temporary molar is yet in position, the first molar having just been removed, and the first bicuspid coming in its place. The cuspid is not so far developed as its fellow of the opposite side. The second permanent molars should also be in place, but they are tardy in their development. While the general contour of the jaw is normal posterior to the cuspids, there is a tendency of the incisors to contraction, with a protrusion of the mesial surface of the centrals. It will be readily noticed that the cuspids are erupting anterior to their normal position, thus crowding the incisors together.

FIG. 8.



Case 2.—Fig. 9. Paul F., age nineteen years; nationality, American. Height of vault, .75 of an inch. Commenced to breathe through the mouth at the age of nine years, at which time his nose was broken. Arrest of development of the bones of the nose. Adenoid growth. Hearing and eyesight are poor.

FIG. 9.



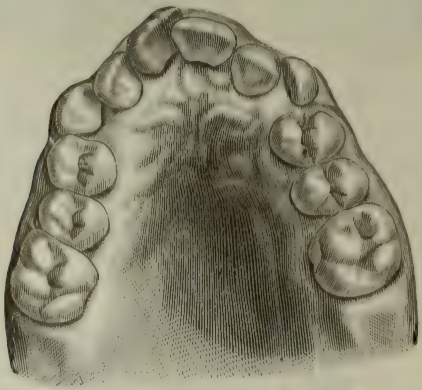
The jaw of this case is well developed, with a normal palate, but higher than the average, being three-fourths of an inch in height. All the teeth have erupted. The anterior teeth have a tendency to contraction, due to the fact that all the teeth tend to push forward;

the central incisors do not protrude as in No. 1, because the lateral incisors overlap them. The right side of the arch tends to assume the saddle-shaped deformity, due to the position of the bicuspids, caused by too long retention of the temporary teeth. It will be observed that the two sides are markedly asymmetrical. This cut nicely illustrates the point previously mentioned, that if contraction of the jaw were due to contraction of muscles in mouth-breathing, both sides would be alike.

Case 3.—Fig. 10. Miss Florence T., age thirteen years; nationality, American. Height of vault, .46 of an inch. Had scarlet fever at five years of age. Commenced to breathe through mouth at the age of eight. Arrest of development of the bones of the face and nose.

This is a well-marked illustration of defective development of the superior maxilla, and also of arrest of development of the bones of the face and nose. As in No. 1, the second molars have not yet made their appearance. The central incisors overlap, but do not protrude. The right side of the arch tends to assume the saddle-shape deformity, due to the position of the bicuspids. The cuspid has not fully erupted on this side, and is still more tardy in its appearance on the left. As is true of No. 2, the two sides are asymmetrical, and the height of the vault is quite a little less than the average, being .46 of an inch. When the second and third molars appear, an unusual protrusion of the anterior teeth must necessarily result in order to give sufficient room for the molars. If this is allowed to progress without mechanical interference, a marked V-shaped deformity will result.

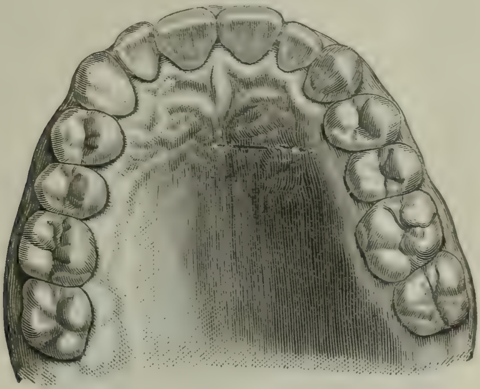
FIG. 10.



Case 4.—Fig. 11. Dr. H. S., age twenty years; nationality, American. Height of vault, .68 of an inch. He has been a mouth-breather all his life. Has deflection of the septum nasi, and at the age of fourteen was operated upon without any benefit. The bones of the nose are well developed, but those of the face are slightly arrested.

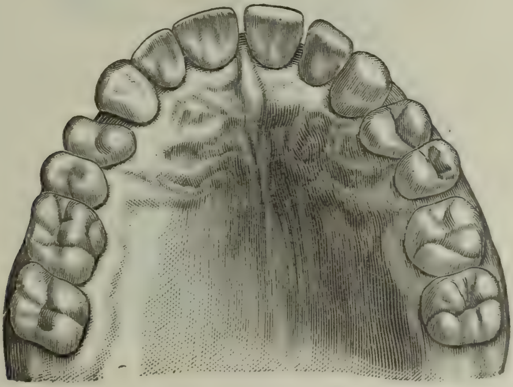
While the jaw is not quite as large as the normal jaw, the teeth are very regular, finely developed, and without a cavity. It would be rare to find a more nearly perfect arch. The articulation with the inferior maxilla is at all points exact, and we have here a marked illustration of an orthognathous jaw.

FIG. 11.



Case 5.—Fig. 12. Mr. William M., age fifty-two years; nationality, American. Height of vault, .43 of an inch. Always breathed through the mouth. Bones of the nose and face well developed. Last year had hypertrophied bone removed from the nose. Eyesight and hearing are good. The jaw is well developed, and shows no deformity.

FIG. 12.

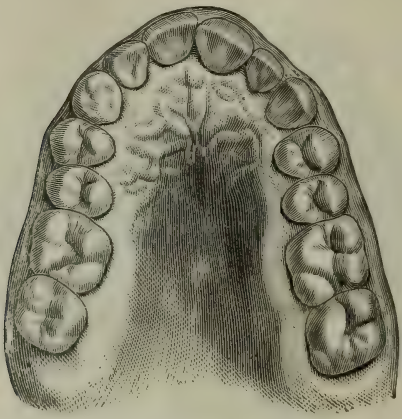


Case 6.—Fig. 13. Miss H. C., age seventeen years; nationality, American. Height of vault, .65 of an inch. Has not always breathed through the mouth. Has adenoid growths. Has had measles and chicken-pox.

This jaw is considerably contracted throughout, but it is more noticeable through its lateral diameter. The alveolar process is hypertrophied on either side, the hypertrophy being more marked on the right side.

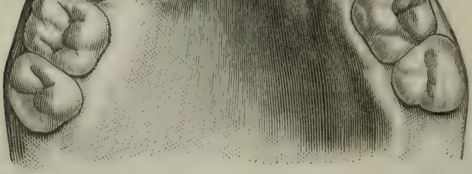
Case 7.—Fig. 14. Kate K., age seventeen years; nationality, American. Height of vault, .65 of an inch. Has always breathed through the mouth. Has post-nasal catarrh. Has had measles and whooping-cough. This jaw was arrested in its development, and the first bicuspids have been extracted to make room for the other teeth.

FIG. 13.



The lateral incisors overlap the centrals, due to a lack of room before the extraction of the bicuspids. The two sides are asymmetrical, the left side diverging to allow the eruption of the second molar.

FIG. 14.

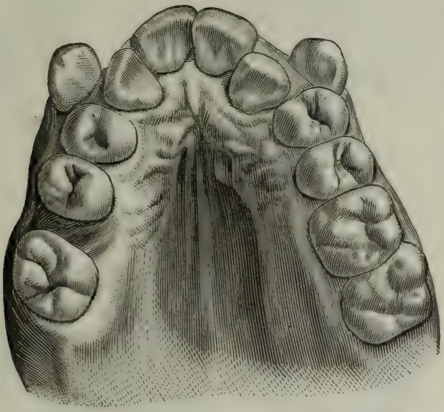


Case 8.—Fig. 15. Mr. H., age eighteen years; nationality, American. Height of vault, .59 of an inch. Has always breathed through the mouth. Had scarlet fever at the age of eighteen months. Received a blow upon the nose which caused a deflection of the septum nasi to

the left. The left nostril is entirely closed by hypertrophy of bone and mucous membrane. There is slight hypertrophy of the mucous membrane of the right nostril, also hypertrophy of the mucous membrane in the post-nasal space. Arrest of development of the bones of the nose. No. 8 is an illustration of marked arrest of development of the entire jaw. The anterior teeth are much crowded, and on the left side the lateral incisor has erupted within the arch ; that of the right side partially within the arch. The cuspids have erupted outside of the arch ; on the right side the sixth-year molar has been extracted, in consequence of which the second molar has pushed forward.

In this case the small jaw is inherited from the mother (whose jaw was unusually small), and is in harmony with the bones of the face.

FIG. 15.



The teeth, which are exceedingly large and have long roots, are inherited from the father, and are so out of proportion to the small jaw that the posterior teeth have moved forward and filled the spaces intended for the cuspids.

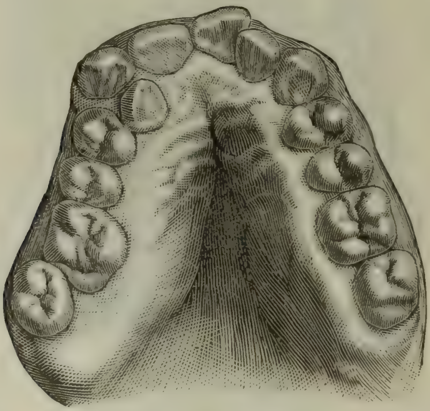
Case 9.—Fig. 16. Geo. H., medical student, age twenty-five years ; nationality, American. Height of vault, .71 of an inch. Commenced to breathe through the mouth at the age of ten. Marked arrest of development of the bones of the face and nose. The nasal cavities are small, and the nasal septum is deflected slightly to the right. Hypertrophy of cartilage on the left side ; the mucous membrane is slightly thickened. The posterior nasal cavities are clean.

The patient has had measles, chicken-pox, mumps, and two attacks of pneumonia. Had severe rheumatism at the age of twenty-one, and at the present time there is tuberculosis of the left ankle.

An examination of the jaws revealed the following facts : the lower jaw is excessively large ; although all of the teeth of the lower jaw tip inward, yet the outer cusps of the upper teeth just touch the inner cusps of the lower teeth. There is marked arrest of development of the upper jaw, and on the right side the arch has a tendency to assume the saddle-shaped deformity. On this side the cuspid has erupted externally to the arch and between the central and the lateral incisors; its mesial surface is directed inward. The lateral incisor is internal to the other teeth. The lateral incisor on the left side is situated internally to the central incisor and cuspid, and has caused a slight rotation of the central incisor. The second molars are small, and have erupted externally to the first molar on account of lack of room in the jaw. The alveolar process and mucous membrane are hypertrophied.

This case clearly shows that at the time of the formation of the irregularities of the teeth the alveolar process and mucous membrane began to hypertrophy; coincident with these was arrest of development of the bones of the face, nose, and jaw, and the habit of mouth-breathing was formed.

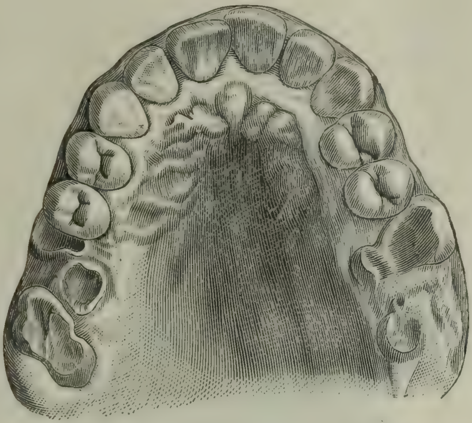
FIG. 16.



Case 10.—Fig. 17. Mr. William S., age thirty-four years; nationality, German. Height of vault, .71 of an inch. Has always breathed through the mouth until an operation four years ago. Has had scarlet fever and measles. As will be observed by examining the cut, this jaw is well developed. The central incisors overlap slightly, due to Riggs's disease. The left side has a tendency to assume the saddle-shaped deformity, due to the position of the bicuspids, which was probably assumed on account of the too long retention of the temporary teeth. The crowns of the molars have decayed and broken off. The thickening of the mucous membrane is the result of Riggs's disease.

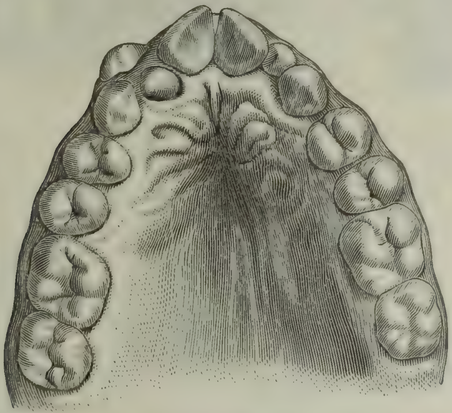
Case 11.—Fig. 18. M. W., age thirteen years; nationality, American. Height of vault, .62 of an inch. Has breathed through the mouth for the past six years. There is arrest of development of the bones of the face and nose. The patient has considerable catarrh. Is now under treatment for irregularities of the teeth.

FIG. 17.



The jaw is much contracted, especially in the anterior part. On the right side the lateral incisor is deformed, and is represented by a conical tooth situated internally to the other teeth. Posterior to this is the temporary cuspid; on account of the retention of this tooth the permanent cuspid is erupting externally to the other teeth and between the temporary cuspid and permanent central incisor. On the left side the lateral incisor is deformed in a similar manner to that on the right, but its position is normal. The temporary cuspid on the left side remains. Owing to the fact that there was insufficient room

FIG. 18.



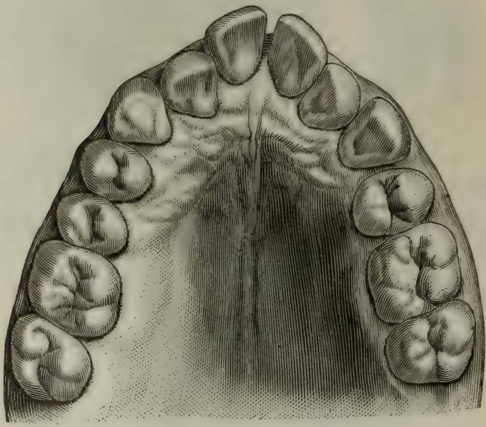
in the jaw for the second molar, the teeth anterior to these moved forward, producing the V-shaped projection of the central incisors.

Case 12.—Fig. 19. Charles D., age fifteen years; nationality, American. Height of vault, .53 of an inch. Deflection of septum nasi and thickening of mucous membrane. The patient has always breathed through the mouth.

This case is similar to case No. 8, in that the small jaw is inherited from the mother and the large teeth from the father.

The dental arch is contracted anterior to the cuspids, and the anterior teeth are crowded; posterior to the cuspids the dental arch is normal. The first bicuspid on the left side has been removed to afford more room for the other teeth; the corresponding tooth on the right side should also have been removed. The fact that it was allowed to remain caused a crowded condition on that side, and the incisor has passed beyond the median line of the jaw, encroaching upon the other side. Owing to there being insufficient room in the jaw for the second molars, the teeth anterior to these have pushed forward, producing the V-shaped protrusion of the central incisors.

FIG. 19.



Case 13.—Fig. 20. Mr. H. B., age twenty years; nationality, ——. Height of vault, .71 of an inch. Has always breathed through the mouth. The alveolar process is well developed, but the maxillary bones are arrested in their development. The left nostril is entirely closed. There is hypertrophy of the mucous membrane of the right nostril.

Has had scarlet fever and whooping-cough. Although there is arrested development of the maxillary bones in this case, no deformity is produced, owing to the fact that the teeth have crowded the alveolar process upon the outer surface of the bone, thus forming a large arch.

The only irregularity of the teeth is on the right side, where the lateral incisor by erupting slightly within the arch has pushed the distal surface of the central incisor slightly outward.

Case 14.—Fig. 21. Mr. M. C., age thirty-nine years; nationality, Canadian. Height of vault, .71 of an inch. Had always breathed through the mouth until he came to Chicago in 1884, since which time he has gradually improved, and can now breathe partially well. He has always suffered from catarrh, and now, when a cold is taken, the mucous membrane of the nose becomes inflamed and mouth-breathing is the result. This case illustrates a marked arrest of development of the jaw; on account of the small size of the jaw, the teeth anterior to the molars pushed forward and became crowded when the molars erupted. Upon the left side the second bicuspid has

FIG. 20.

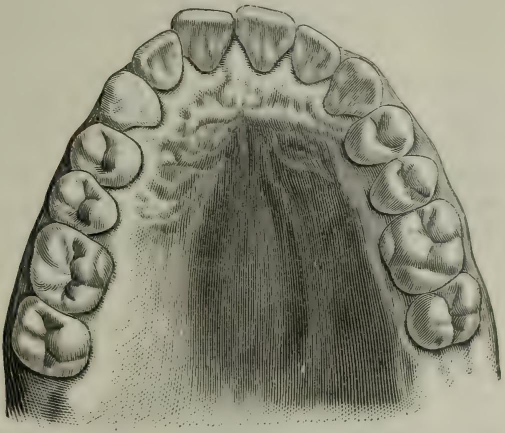
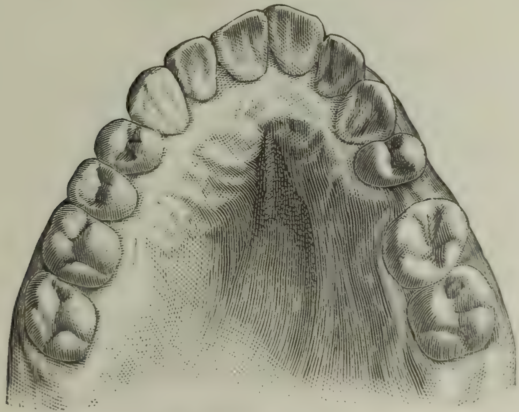


FIG. 21.



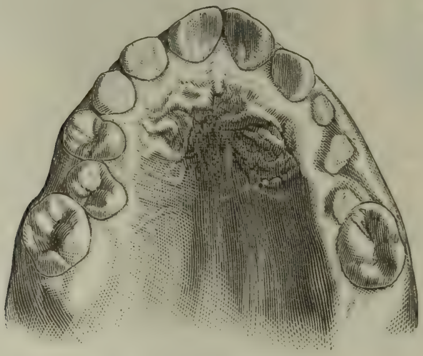
been removed, thus affording sufficient room for the eruption of the second molar on that side.

Case 15.—Fig. 22. Miss C., age eight years ; nationality, Canadian. Height of vault, .43 of an inch. Has always been a mouth-breather. Has suffered from catarrh for the past five years. Her general health has improved since her removal to Chicago, six months ago.

This cut shows a marked arrest of development of the superior maxilla.

This case is illustrated at this age, eight years, as being of unusual interest in connection with the theories advanced in this paper. The unusually low elevation of the vault is due to lack of development ; no doubt the normal height will be reached at the proper age. I extracted the temporary molars and cuspids upon the left side, and the temporary second molar upon the right side, just before securing the model. Although the permanent bicuspids and cuspids upon the left side are not visible, yet the appearance of the alveolar process leads me to believe that their position will be normal. Upon the right side all the teeth belong to the permanent set excepting the cuspid. The cause and manner of the production of the saddle-shaped arch upon this side of the jaw is nicely illustrated in the position assumed by the second bicuspid and first permanent molar. Upon removing the temporary molar, the crown of the bicuspid was observed to be situated exactly in the position represented in the illustration. The first permanent molar, having moved forward, has crowded the cuspid into the roof of the mouth. The V-shaped appearance of the incisors is due to lack of room in the jaw for their normal eruption.

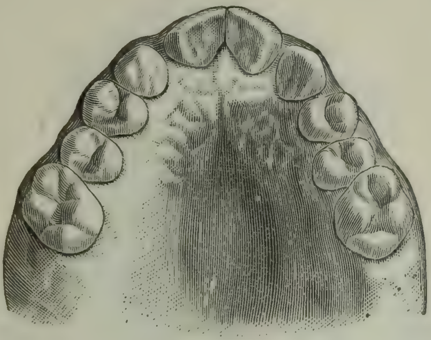
FIG. 22.



Case 16.—Fig. 23. Miss J., age thirteen years ; nationality, Hebrew, born in America. Height of vault, .59 of an inch. Adenoid growth in post-nasal space. She is unable to breathe through the nose.

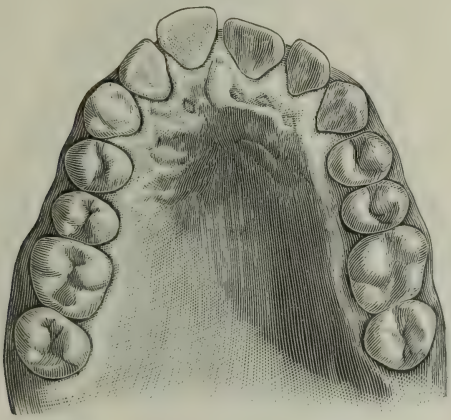
This is a case of unusual interest ; the arrest of development is very marked, and the maxilla is unusually small. The lateral incisors have never erupted, and the cuspids have moved forward and taken their places. The jaw is very narrow across at the bicuspids, and much contracted anterior to them. The jaw is of a marked V shape.

FIG. 23.



Case 17.—Fig. 24. Master L., age thirteen years; nationality, American. Height of vault, .62 of an inch. He has breathed through the mouth for the past six years. There is considerable arrest of development of the bones of the nose. The left nostril has collapsed and the right nostril partially, so that the patient can breathe through that side only, and with difficulty.

FIG. 24.



As will be observed, the jaw in this case is well developed. The forward movement of the incisors is due entirely to a local cause, that of irritation, produced by the lower teeth striking against the roof of the mouth, which caused a deposit of bone-cells at that point.

Case 18.—Fig. 25. Geo. W., age fourteen years. Nationality, American. Height of vault, .59 of an inch. Has always breathed through the mouth. The septum nasi is deflected; there is hypertrophy of the mucous membrane, and the left nostril is closed.

In this case the jaw is well developed, and although the teeth are large there is no marked deformity. The central incisors overlap slightly; the anterior teeth protrude on account of the pushing forward of the posterior teeth. A side view shows this forward inclination of all the teeth.

FIG. 25.

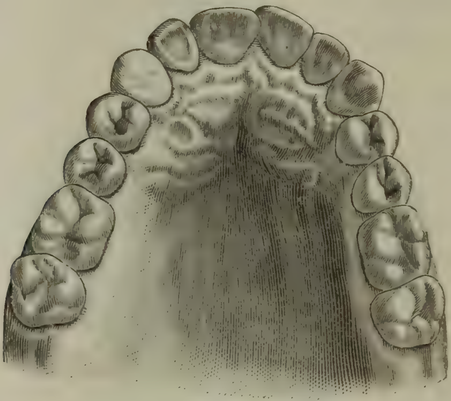
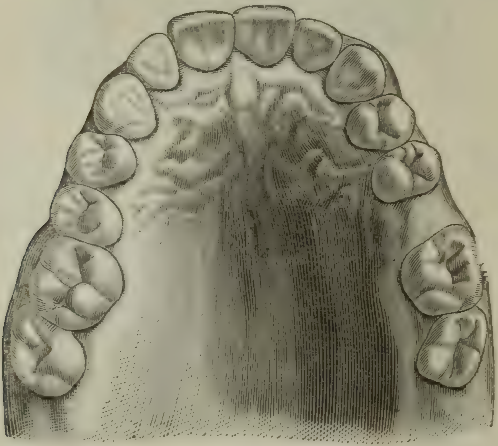


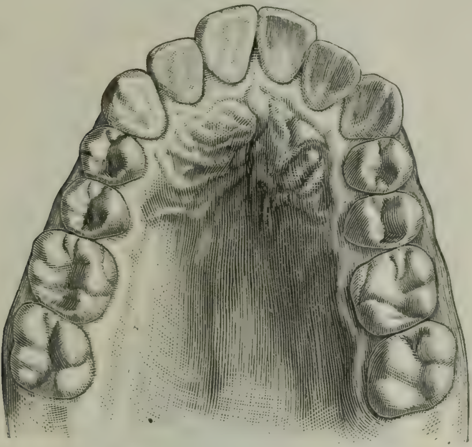
FIG. 26.



Case 19.—Fig. 26. W. T. O., age twenty-five years; nationality, American. Height of vault, .62 of an inch. He has been a mouth-breather for twelve years. The left nostril is entirely closed, the result of a blow received at the age of thirteen.

In this case the jaw is well developed. The slight saddle-shaped appearance of the right side is due to the position of the second bicuspid and first molar. The second molar has crowded the first molar forward and inward. On the left side the first molar has been removed and the second molar has moved forward, partially filling the space.

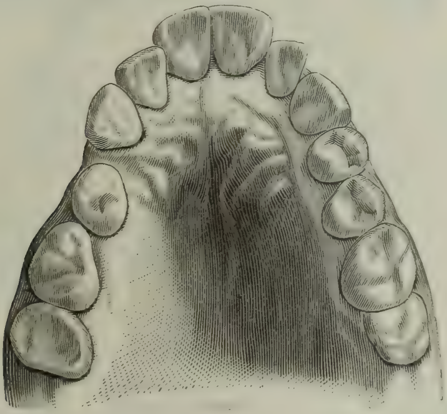
FIG. 27.



Case 20.—Fig. 27. M. H., age sixteen years ; nationality, American. Height of vault, .59 of an inch. Has always been a mouth-breather. There is present a complete collapse of the nostrils.

This case represents a small jaw anterior to the cuspids. There is a slight protrusion of the anterior teeth and alveolar process. On the left side the lateral incisor has erupted slightly inward relatively to the central incisor and cuspid. The two sides are markedly asymmetrical ; the left side is quite undeveloped.

FIG. 28.



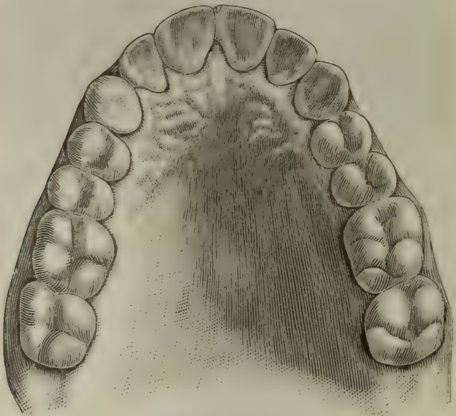
Case 21.—Fig. 28. Miss H. T., age —— ; nationality, ——.

Height of vault, .62 of an inch. Has always been a mouth-breather because of the thickening of the mucous membrane of the nose.

In this case the development of the maxilla has been arrested. There is considerable protrusion of the anterior teeth and alveolar process, due to lack of room ; associated with this is Riggs's disease. The jaw is narrow and compressed in the region of the bicuspids. On the right side the first bicuspid has been removed to afford room for the other teeth. The left lateral incisor is small and the left bicuspids are situated within the arch, erupting in this position because of the retention of the temporary teeth. This side approximates the saddle-shaped deformity.

Case 22.—Fig. 29. J. G., age sixteen years ; nationality, American. Height of vault, .50 of an inch. He has been a mouth-breather for ten years. The anterior part of the jaw is contracted, approximating the V-shaped deformity. There is no irregularity of the teeth.

FIG. 29.

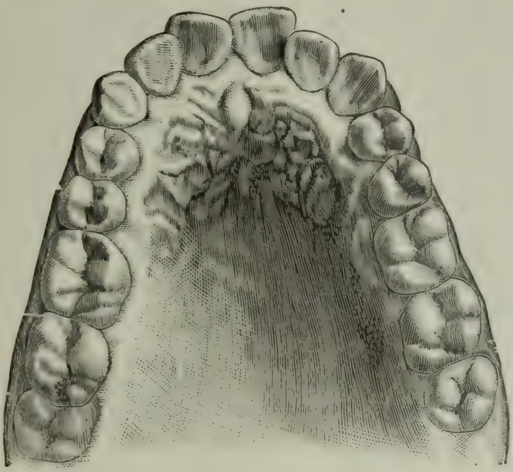


Case 23.—Fig. 30. Mr. G. C. A., age twenty-six years ; nationality, American. Height of vault, .75 of an inch. Has always breathed through the mouth.

This case illustrates the lack of harmony between the size of the jaw and the teeth, in consequence of which the anterior teeth have erupted irregularly. The central incisors overlap slightly ; the approximal surfaces of the lateral incisors are internal to the palatine surfaces of the centrals. Posterior to the cuspids the dental arch is normal.

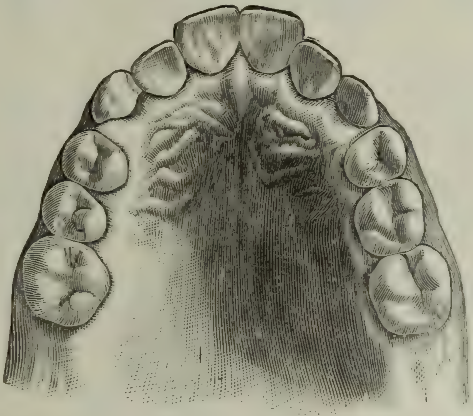
Case 24.—Fig. 31. Miss E. B., age twelve years ; nationality, American. Height of vault, .53 of an inch. Has always breathed through the mouth. Septum nasi is deflected, and the left nostril is closed. The anterior part of the jaw is contracted, and in consequence of this contraction the central incisors protrude. The lateral incisors are slightly internal to the centrals, lack of room in the jaw preventing them from assuming their normal position. It will be noticed that the cuspids are erupting. On the left side the second temporary molar is seen.

FIG. 30.



With this presentation of a very considerable number of recorded observations accompanied by many representative illustrations, the writer respectfully submits that his conclusions must be deemed to be fairly founded on facts, a refutation of which will require the citation of a like series of actual observations on the part of any objector to the views herein set forth.

FIG. 31.



METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 814.)

Clamps.—The usefulness of a clamp largely depends upon its grip upon the tooth to which it may be applied, and this in turn is proportionate to its adaptation and to its spring force. When not in use the jaws should approach each other so nearly that the distance between them is about one-half of the diameter of the tooth which it is intended to encircle, and the spring should be so strong that when stretched over such a tooth it will bind it firmly. A clamp for a bicuspid should have a spring so powerful that one could not endure the pressure were it placed upon the little finger, and one for a molar should cause discomfort if similarly placed. This is a fair test, and all which do not so pinch the finger would prove worthless in general practice.

If the practitioner can afford it, he should supply himself with a set of Delos Palmer clamps, because these are more accurate in their adaptation than any others which have been devised. Where the dentist is compelled to economize, he will be able to get along comfortably with just three clamps, excluding cervix clamps. These are bicuspid clamp No. 27, and molar clamps Nos. 26 and 60. Of these latter, No. 60 is adaptable to more cases than any one clamp that I have ever used, but it will sometimes occur that a longer arm to the bow would give a better view of the cavity, by stretching the rubber backward. Then No. 26 is preferable.

FIG. 51.

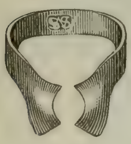


FIG. 52.

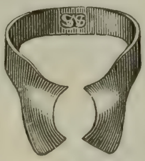
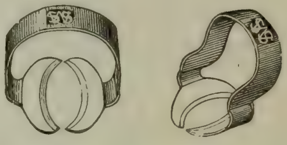


FIG. 53.



A clamp is not needed with any of the incisors or cuspids as a rule, except for cavities occurring along the labial festoon. For this position the ideal clamp, which will be universal in its application, is still to be invented. There are two, however, which, within their limitations, are most useful. One is Dr. W. W. Evans's form, Nos. 74 and 75. These are made either with or without a set screw. I believe that this screw has been practically useless to the majority of dentists, and yet it is really invaluable. The inventor says of it, "The office of the screw is to tighten the hold in cases where the clamp does not fit securely." While this may have been the object aimed at, it is a purpose not served for several reasons. In the first place, it not infrequently happens that the clamp is not pressed up sufficiently far to allow the screw to reach the tooth at all. Secondly, when it does touch the tooth it rests upon a sloping surface, so that if it is screwed down it displaces the clamp. Again, were it to reach a perfectly flat plane, at the very best part of the tooth for its action, a moment's thought will show that to screw it down would have a tendency to lift the jaws up from the tooth, and so loosen the clamp. Therefore as a screw it is useless, but as a projection above the surface it is most valuable. Supposing the tooth to be filled is a cuspid, the procedure would be to apply the dam over several teeth, and then tie ligatures about the necks of the lateral incisor and the bicuspid, leaving long ends. Next press the clamp high up on the tooth, and, holding it firmly, make a knot with the loose ends of the ligatures from both teeth, around the projecting head of the screw, so that when drawn tightly it tends to force the clamp upward. Completing the knot makes the clamp secure, and the operation may be finished without fear of slipping. Of course, for this purpose, a small hook would answer in place of the screw-head, but we may utilize the clamp as it is furnished to us. Therefore the form with the screw is preferable to that which is without it.

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FIG. 54.

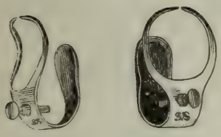
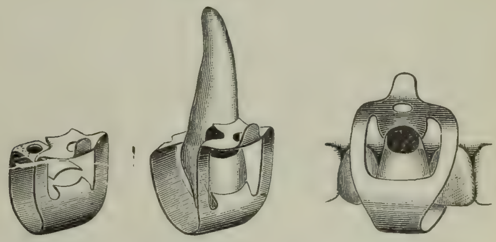


FIG. 55.



The peculiar shape of this clamp makes it specially useful in cuspids, the bulbous portion of the tooth at the palatal side near the gum offering an excellent point of resistance to the concaved jaw, while the two narrow projections above admirably fit about the labial surface and offer good view of the work. At the same time the clamp is limited in its usefulness by the fact that these projecting jaws frequently hide a portion of the cavity should it encroach upon the approximal surface. In favorable cases I have filled the portion along the festoon, and then have removed the clamp in order to reach that part which it covered. It is an exception, however, when this can be done without the ingress of moisture. Another class of cavities where this clamp cannot be employed is where there has been extreme recession of the gum about the neck of a long cuspid, followed by caries which reaches the receded gum-margin. The bow limits the distance to which the clamp may be made to reach.

For teeth other than the cuspids the How cervix clamp, No. 125, is the best, known to me. The inventor has recognized the fact that a clamp for these cases should have three bearings upon the tooth, because of the fact that the palatal jaw will not bite on a line with the labial. Being bowed over the cutting-edge of the tooth, it has the same limitation as the Evans.

I will dismiss the subject of clamps by saying that, excepting festoon cavities, the clamp should preferably be placed upon a tooth other than the one to be filled ; also, in applying a clamp care should be taken not to press too hard against the sensitive gum, and especially not to bite the gum itself, as is often done on the palatal side.

Leakage.—When we recall that the dam is placed over teeth for the purpose of keeping out moisture, it is plain that when leakage occurs our object has been frustrated either wholly or in part. Much has been written to account for the failure of gold fillings along the gingival border. I think ninety per cent. of these failures may be attributed to leakage during the operation. Moisture is easily dammed up in a dry mouth, but in one abundantly supplied with saliva the greatest skill is required to keep a cavity absolutely dry,—so dry that at no time after placing the dam can even a trace of moisture be observed.

It will profit us to consider somewhat carefully this subject of leakage, especially in relation to failure at the gingival margin.

Let us suppose that the cavity is in the approximal surface of a central incisor, and so closely approaches the gum that a ligature is needed to bring the gingival border into view. Before placing the dam the parts are all wet ; so after the dam has been placed this moisture must be wiped away, and this is done. The dentist then proceeds to prepare the cavity, when, after using a chip-blower, he is surprised to find that some of the dust still adheres near the upper border. This shows that there was moisture. He concludes that he had not wiped it thoroughly dry, and does so now. He uses the engine-bur a second time, and when the dust has been blown away there is still the same evidence of moisture. Having thoroughly dried the part before, he is now satisfied that there is a leak. Examination shows none, or rather none that is discernible to the eye. Therefore, as he can find no leak, he is satisfied that there is none. To be quite sure, however, the cavity now being ready, he uses the warm-air syringe, and proceeds with his filling, placing a handsome piece of work, beautifully polished. In a couple of years he finds this with decay about the gingival border, and perhaps writes a learned essay upon the instability of fillings at this point.

Now, what are the facts? When the dam was first placed and the parts dried, all seemed well. As soon as the engine was used, moisture appeared, recurring a second time. Lastly, the spunk and hot air made all dry once more, and the eye, watching, could detect no moisture. Therefore the mind reasoned, "No leak." Nevertheless there was a leak, or else how did moisture twice recur? The nature of this leakage will be explained in a moment, but just here I must elucidate this enigma and show its relation to the subsequent failure of the filling; otherwise it will be said, "A leak which did not interfere with the operation of filling was of no consequence."

When the dam was first placed and the parts dried, all moisture seemed to have been excluded. This simply meant that the dam was effectual *as long as the parts were in a state of rest.* Then the engine-bur was used, and moisture appeared. This is accounted for by the statement that *whenever a patient is hurt, fluids are discharged into the mouth*, whether by nervous or by muscular action is immaterial. The fact is the important thing, and it is a fact. Thus after the use of the hot-air blast, the parts being at rest, all seeming dry the operator proceeded. In doing so he made pressure upon the tooth, which caused pain, thereby inducing a further ingress of moisture. The pain of packing the gold being less than that of using the bur, the fluid accumulates more slowly. Thus it does not interfere with the placing of gold along the extent of the border. About this time, however, moisture, unseen, slowly dampens the gold at this point, so that a *tiny* pellet would not cohere. But the operator is not using tiny pellets, but pieces of some size, *which he first attaches to the unwet gold within the cavity, and then mallets down over the border.* Thus it may happen that each piece of gold coheres along a portion of its extent, so keeping its place, *while there is no cohesion whatever along the gingival border.* Such a filling may be polished and burnished so as to present a fine appearance, but there is a weak spot, and it is along the gingival border, where the leak allowed a slight percolation of moisture.

I must now explain the existence of a leak which is undiscernible by the eye, and yet allows the entrance of moisture. It most often occurs because of the fact that the hole punched for the passage of the tooth is made too large. In a very wet mouth, if the dam is slipped over a tooth readily, the chances are that one of these invisible leaks will occur. Therefore, in such mouths the holes should be cut so small that they just escape tearing when stretched over the teeth. In this manner the tooth is hugged so tightly that the contractile action of the rubber compels it to reach as small a diameter as possible, which is found up under the gum-margin, because of the conical shape of roots. Of course in a dry mouth any tendency to leakage caused by a loosely-binding dam may be, and usually is, overcome by the ligature. In the case above described, where there was barely room for the silk above the border of the cavity, the ligature itself operated against the discovery of the cause of leakage, while it in no way prevented the excessive moisture from creeping under it, and immediately upon the gold.

Another cause of leakage is seen in Fig. 56, which shows the dam over two teeth whose crowns are omitted in order that the points of leakage, *a*, may be more readily seen. Here the fault has not been that the holes were made too large, but insufficient space was left between them, and the stretching necessary to place the dam over two teeth has produced a space next to each, as pictured. Of course this may be avoided by proper spacing. In the next diagram, however, Fig. 57, is shown a similar difficulty arising from a different cause.

FIG. 56.

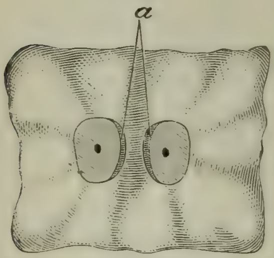
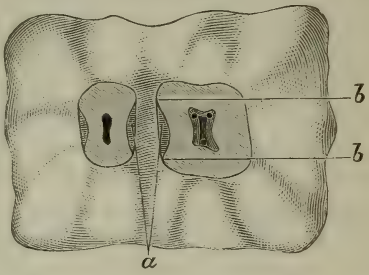


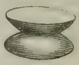
FIG. 57.



Here a section through the teeth near the gum-line discloses a distinct concavity along the approximal surfaces. The dam stretched over such a tooth must follow a straight line from the points *b*, *b*, so that a space is unavoidably left. The question arises, Can the dam be placed here so as to avoid leakage? Moisture cannot be kept out by the dam alone, but, the condition being recognized, a roll of cotton dipped in sandarac varnish should be packed along the leak ; then a ligature should be knotted so as to present three or four knots, which should be placed over the cotton and the silk then firmly tied around the neck of the tooth. In a few moments all leakage ceases.

Another occasional source of leakage is where, in placing the dam so as to include a molar, the edge is not forced between the teeth at the posterior border of the molar. The clamp is placed, and all seems well, but in a wet mouth moisture will inevitably creep in. Indeed, there are many instances where leakage will occur about a clamp which will cease if the clamp be removed and a ligature tied about the tooth before replacing it. Again, it may happen that there is a space along a palatal or labial surface of a molar similar to that shown in Fig. 57, as occurring at the approximal side. This is seldom found in normal conditions, but often occurs where there has been recession which reaches the bifurcation. In these cases the roll of cotton dipped in sandarac should be laid over the part, and held in position by the jaws of the clamp, which are pressed against it.

FIG. 58.



A slight tear in the dam, occurring at a time when the filling is so far advanced that the dam cannot be renewed, may sometimes be remedied by dipping a piece of sponge in sandarac, and then forcing it into the hole. The same thing may be accomplished by making a button of wood, as shown in Fig. 58, which may be whittled in a moment from a piece of orange-wood.

The best course is not to tear the dam, and much trouble may be avoided in this direction by doing all the preparation of the cavity before placing the dam, except in cases of sensitive teeth, or those in which the pulp is suspected to be nearly exposed ; then the cavities should be prepared dry. In using a sand-paper disk, if the edge is allowed to run over a piece of soap it will not cut the dam, and is less likely to become entangled in the folds of rubber. The dam is frequently cut with the sharp points of clamps, so that care should be exercised in that direction.

The Napkin.—The napkin I believe I use more than many, and differently from some. The small napkin made into a roll I find much use for in the lower jaw, but seldom upon the upper. It should be about three inches square and without fringe. In all ordinary cases it may be folded into a roll and applied about the teeth in the form of a horseshoe—the ends forward. It is readily held in position with the mouth-mirror. Occasionally it is of advantage to secure it more firmly, in which instance it may be caught against the labial and lingual sides of the tooth with a clamp. A special clamp has been devised for this, but any good molar clamp will serve well enough. In cases where a lower sixth- or twelfth-year molar, recently erupted, is too short to permit the use of a clamp, and yet the condition is such that the operator deems it advisable to fill with gold, the napkin may be best held in place with the napkin-holder, which is a metal horseshoe with an arm which slides in a ratchet having a piece to fit under the chin. This may be arranged to hold a napkin securely for half an hour or longer, at the same time forcing the tongue out of the way.

Sometimes the only necessity for using a napkin is the fact that the patient is oversensitive and easily nauseated by the dam. If there is danger of moisture arising between the teeth, a piece of rubber-dam just large enough to cover the two teeth and immediate vicinity may be placed without inconvenience to the patient, and then the napkin in combination with this will keep all perfectly dry for a short time.

Where I use a napkin in the upper jaw, I simply fold a large napkin once, so as to present a doubled edge, and pass this back behind the tooth to be filled, holding it with the mouth-mirror. This is less annoying to the patient than any other method, and will keep a crown cavity dry long enough to insert gold. I have filled the posterior approximal surfaces of wisdom-teeth in this way, producing permanent gold fillings. This, however, is the most difficult place for using a napkin, owing to the fact that the muscles offer tremendous resistance.

Chloro-Percha and other Devices for Controlling Moisture.—Chloro-percha may be made to serve a very useful purpose at times. A case may arise where it is impossible to apply a clamp to a festoon cavity, which is nevertheless so small that it could be quickly filled if only kept dry ; a napkin will not serve, for, though it might be made to dam up the saliva, there is often a weeping of mucus from the membrane overhanging the cavity, and this is sufficient to prevent the insertion of a cohesive gold filling. If the gum be wiped as dry as possible, and then smeared with a thin coating of chloro-percha, the cavity may be filled successfully by a skillful, rapid operator.

There is a device of which I have made frequent use, but which I believe is now difficult to obtain. It consisted of a sort of clamp, which, however, was not needed, and concaved disks of pipe-clay. It is well known that a fresh clay pipe will stick to the lips. These disks, made of the same material, could be placed over the orifice of the duct of Steno, and would adhere, shutting off that supply of saliva for an hour or two. In many cases they prove most useful.

Many use Japanese bibulous paper for damming up saliva. Its advantage over the napkin is that like the clay disk it adheres to the mucous membrane, but it absorbs moisture more rapidly. For short operations, however, it is frequently a good plan to make a stiff roll of this paper and stuff it between the cheek and alveolar process, thus covering the opening of the duct.

There are little rolls of cotton which are now sold for this same purpose, and are useful.

Wedges vs. *Separators.*—I have the boldness to assert that steel separators have worked more harm than good to the profession. I have no doubt that in the hands of the most skillful, and used with discriminating judgment, they have saved much time for this limited class ; but in the practice of the many the result has been too often the filling of teeth with insufficient space. The man does not live who can fill as perfectly in a narrow crevice as he could in an approximal surface fully exposed by the loss of a tooth. It follows logically that as much space should be obtained as is possible without permanent injury.

There are several reasons why a perfect filling cannot be made where the space is very slight, but the chief one is that gold should be built out so far beyond the true surface, and over all borders, that the final finishing will cut down to a perfectly condensed part of the gold. For this reason, where teeth are forced apart with steel separators, it often happens that the fillings when finished show pitting, or at best will not take a mirror-like polish, which should be made on all, but more especially upon those in approximal surfaces.

There are two kinds of cavities which require considerable space. These are very small, and very large cavities. To fill a tiny cavity through a narrow crevice is to court failure, while it is simply impossible to reach into all parts of large cavities, in long bicuspids, without considerable room. In the latter, all that part which is most inaccessible is improperly filled, but being also out of sight is not seen by the patient, and not looked at too closely by the dentist, who thinks he cannot afford the time required for properly separating teeth.

If it is important to fill a tooth at all, it is important to fill it well, and to fill it well the cavity must be accessible. This can only be accomplished by separating as widely as is consistent with safety. The cases where teeth can be forced as far apart (with the patient's consent) by using a separator, as by the old-fashioned system of wedging, are so few, that to buy a separator seems to me to throw away money, for I refuse to insert gold with insufficient room for thorough work.

Where the patient is easily hurt, if there is no hurry, the teeth may be painlessly forced apart with tape. The patient should be supplied with this and directed to change it, increasing the number of thicknesses from day to day until the space is adequate.

The rubber wedge is the most positive, and at the same time the most painful, usually making the teeth so sore to the touch that they must be allowed to rest for several days. This necessitates the removal of the wedge and the insertion of a piece of gutta-percha. This is placed between the teeth cold, trimmed just thick enough to slightly wedge when pressed in. With a warm burnisher the surplus is then removed on each side, and the soreness will subside very rapidly, the teeth meanwhile being kept apart. The main objection to rubber is the tendency to slide up against or under the gum. This may usually be prevented by allowing a bit of the wedge to extend beyond the cutting-edges of the teeth. Sometimes it is well to apply the dam, smear the teeth lightly with sandarac, and then place the wedge, after which it will not be apt to slip. The dam can be removed by first cutting the septum of rubber between the teeth.

Where it can be used, I like the wooden wedge better than any other. To apply it, first cut a thin wedge, soap it, and slip it between the teeth next to the gum. Next trim the wedge proper with a long taper, soap it, and force between the teeth, driving it into place with gentle taps. After cutting off the ends, withdraw the wedge which was first placed, thus relieving the pressure against the gum.

Whenever there is sufficient space above the gingival margin of the cavity to permit it, a wedge should be forced between the teeth during the operation of filling. This not only supports the teeth, lessening the shock from the mallet blows, but it protects the dam when the disk is used. This wedge should be made thin and shaped as seen in Fig. 59. The grooves at each side make it more firm, and prevent it from riding up. As the wooden wedge is not always entirely satisfactory, owing to the fact that if proper grooves be cut it sometimes becomes difficult or impossible to force it into place, I have devised a steel wedge which serves admirably in most cases. This is shown in Fig. 60. It is similar in general shape to the wooden wedge, but a V-shaped cut forms the sides into two arms which can be sprung together, and so forced into place, where it is retained by the strength of the spring. It will be noticed that this has a tendency to further separate the teeth; this is slight, and no disadvantage.

FIG. 59.

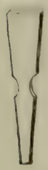
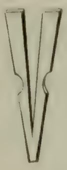


FIG. 60.



The Uses and Dangers of Matrices.—If separators have worked evil, matrices have proved even a more disastrous delusion. It seems so easy to prove that a tooth which has been encircled by a matrix cannot be properly filled with gold, that it is astonishing that so many really skillful men use them.

The argument is this: What is the principle upon which a matrix is used? It is made to supply a lost wall, and thus to produce a cavity which is practically similar to one which has all walls standing, which latter is admittedly the least difficult to fill. This the matrix does, and since the cavity which it simplifies is usually most difficult, at a casual glance it would appear that the matrix is a most valuable instrument. The fallacy lies in this, that while (perhaps) it renders the actual filling-process more simple, *it forms the gold so that it becomes impossible to properly polish it.* To explain this the illustration (Fig. 61) will serve. The matrix is seen drawn tightly around the bicuspid. The teeth have not been wedged, since no space is needed save for the matrix, which usually can be crowded between the teeth in their normal position: indeed, it is usually preferred that the teeth should be close together. It seems to me that the logic which I am now about to use is simply unanswerable. The tooth being filled, and the matrix removed, it is certainly true that *any polishing done with sand-paper or file must remove a portion of the tooth, however little, and thus produce a permanent space.* I have refilled teeth because this had been done. But it may be contended that it is not necessary to polish between the teeth when a matrix has been used, since the gold packed against the matrix must be already smooth. Let us consider this. I have contended that all fillings, and especially those in approximal surfaces, should be made as smooth as a mirror. To produce such a surface by simply packing gold, it follows that the surface against which the gold is packed should be as smooth as glass. This is not true of any matrix, but can this be done? I presume that few men would claim more skill than that which was possessed by Dr. Marshall H. Webb. Several years ago I had the honor of taking part in a friendly contest with him and several others, to test various methods of inserting gold. We used different kinds of mallets, and filled glass tubes set in wood, these being held in place with cement. Here we had practically, *glass matrices.* After the fillings were made they were tested in various ways. To determine the adaptation to the walls (glass) they were placed in an aniline dye. *All of them leaked badly.* They were then removed from the tubes and examined with a magnifying glass. *All of them were badly pitted, the pits showing plainly even to the naked eye.* Thus it follows that several gentlemen, Dr. Webb among the number, failed to make gold adapt itself to a smooth surface. Therefore they could not pack gold against the smooth surface of a matrix, so that upon the removal of the matrix the gold would be polished. Who will claim to do in such a case what Dr. Webb could not? It may be asked, If these fillings leaked, why do not fillings in teeth leak? The answer is that in the tooth the gold is packed against a *rough* surface, which by offering resistance makes it possible to obtain a sufficiently accurate adaptation.

FIG. 61.

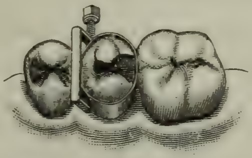
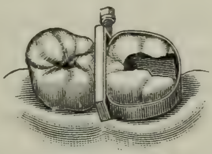


FIG. 62.



It will be claimed that a matrix may be made of a material which will yield, so that under the force of the mallet the gold will bulge beyond the proper contour, and may then be polished. This is true of the upper two-thirds, but is not true of the gingival margin. *There is but one way to produce a perfect approximal filling; that is, to obtain sufficient space so that the gold may be made to extend over all margins, and bulge beyond the normal contour, so that when all is trimmed away a perfect surface is produced at all parts, and of such contour that the teeth returning to normal position will knuckle. This is impossible with a matrix.*

There is no objection to using a matrix around a tooth when the cavity is next to a space made by the loss of a tooth (Fig. 62), for here the filling may be polished, the slight loss of tooth-substance being of no consequence. The greatest use for a matrix is where a large part of a tooth must be contoured with amalgam, for this is a material which, because of its plasticity, would be most difficult to use without the support which the matrix gives. Moreover, it is a material which can be polished with very little loss of substance. Where it is possible, the matrix should be allowed to remain in place twenty-four hours.

To sum up, a matrix is invaluable when amalgam is to be inserted, and disadvantageous where gold is to be employed.

(To be continued.)

NITROUS OXIDE GAS VIEWED FROM A PRACTICAL STANDPOINT.

BY JOHN D. THOMAS, D.D.S., PHILADELPHIA, PA.

(Read before the Joint Meeting of the Pennsylvania and New Jersey Dental Societies, Asbury Park, N. J., July 15, 1891.)

I DESIRE to acknowledge the compliment paid me in the invitation to present a paper upon a subject of so much importance to the dental profession as nitrous oxide gas; yet I respond with feelings of the greatest trepidation and reluctance, being borne down by a consciousness of my inability to present the subject in a way at all commensurate with its merits.

It has been my lot in life to have been connected with its use in an entirely practical way; so, with your permission, I shall confine my paper to the consideration of the subject from this standpoint, leaving the questions of its physiological and pathological action for others to consider who make a special study of these departments of science.

It is now some twenty-eight years since nitrous oxide was introduced, or rather its use revived, by the efforts of Dr. Colton, for the purpose of extracting teeth, when, like every new thing, it had its way to make against opposition and prejudice in the profession and the suspicion and fear of the public. Like everything which possesses true merit, it grew from the first in popularity, and has continued to do so, until to-day it is regarded by everyone as the safest of all anesthetics, and pre-eminently the most desirable for dental purposes.

That nitrous oxide is a perfectly safe anesthetic—safe, I mean, from fatal consequences—seems hardly to admit of question, as is demonstrated by the testimony exhibited in the thousands, if not millions, of people to whom it has been successfully administered.

There is no record by which it can be accurately ascertained how many people have taken it since it was introduced in 1863; but the latest, and probably most nearly correct, computation is that given by the late Dr. J. W. White in Dr. H. C. Wood's paper upon anesthesia, read before the Berlin Medical Congress in 1890, in which it is estimated that fully seven hundred and fifty thousand people annually inhale it in this country alone.

Dr. W. F. Litch, in an article upon anesthesia published in the "American System of Dentistry," has made a very careful and complete compilation of all the fatal cases attributed to nitrous oxide, and he there shows eleven cases of death; but in a recapitulation he eliminates four of them from the list as being in no way connected with the gas. Of the seven remaining, you will notice five of them occurred in Europe and but two in this country. If, as they say in stock speculation, we strike an average by dividing twenty-eight, the number of years in which nitrous oxide has been in use, by two, which would give fourteen, and multiply the annual number—750,000—by it, we would have 10,500,000 people who had taken the gas in this country, with but two deaths resulting therefrom. Of these, the first occurred in 1864,—within a year after the beginning of its use. It is said the patient recovered from the effects of the gas and walked into an adjoining room apparently well; he shortly returned and complained of shortness of breath, sank upon a sofa, and expired in a few moments. The coroner's verdict was that death was caused by congestion of the lungs, induced by the inhalation of nitrous oxide.

It is difficult to comprehend how the inhalation could have produced congestion of the lungs, as an after-affect to have caused immediate death; and I would be inclined to think it more from nervous depression and final heart-failure, which could have been from reaction rather than congestion. At all events, the explanation of the result seems hardly satisfactory in the light of our present knowledge, and the case is a doubtful one as attributed to the effects of the gas.

The second case is reported as follows: "In Chicago, October, 1871, a patient died under the influence of nitrous oxide, in the office of a dentist two or three days before the great fire which destroyed the most important part of the city. As a consequence of the confusion produced by that event, the fact of the death became known to but few persons, and was soon forgotten." Here, then, are two cases only, which at best are somewhat obscure, which can be produced in a record of a possible 10,500,000 administrations, after having been used by practitioners of all grades of experience and capability, from the young graduate just out of the clinic to the specialist who may have given it to thousands; from the most ignorant to the most learned in the profession. This is why we can claim for nitrous oxide that it is the safest of all anesthetics, and yet I do not think anyone would presume to declare that there is no danger to be feared from its use; on the contrary, there are serious forms of dangers in connection with its use which, as one becomes familiar with its effects, lead him to marvel that so many have escaped. Any agent which will produce unconsciousness in the strongest man within a minute, as nitrous oxide will do, we must admit is carrying him toward the point of final dissolution at a pretty rapid rate; but fortunately the natural effects of the gas are accompanied by such distressing appearances that even the most inexperienced is made cognizant of approaching danger, and herein lies a principal element of the safety with which its use has been attended.

While from the foregoing facts you may agree with me that nitrous oxide is as nearly an absolutely safe anesthetic as would seem possible to obtain, it has not proven so perfectly satisfactory in other respects to the general practitioner. In our cities, extracting and using the gas have been in a large degree transferred to those who make that branch of dentistry a specialty; and it is here where its great advantage to the dentist, as well as to his patient, is particularly demonstrated, but it nevertheless possesses great benefit in general practice.

To make the use of nitrous oxide perfectly successful, there are some factors which are absolutely necessary.

In the first place, the gas must be perfectly pure, and, if kept over water, must be fresh. The ammonia nitrate should always be tested before decomposition, and if there should be found the slightest trace of any chlorides it should be discarded. Although you may use wash-bottles for the purpose of eliminating the chlorine, experience shows that it will fail to do so, and the presence of chlorine in the gas will produce very grave depression of the heart's action, as well as general prostration. Care should also be taken to guard against the application of excessive heat in its manufacture. Gas made at too high a temperature will cause your patient to exhibit rapidly the signs of anesthesia, with highly accelerated heart-action and respiration; yet the moment the operation is commenced he will manifest great mental excitement and become almost unmanageable in his struggles, followed with general lassitude from reaction; and though no particularly alarming or serious symptom may appear, there is dissatisfaction to both your patient and yourself.

At the present time, however, the dentist is relieved of the cares of manufacture by being supplied from the dental depots with the gas compressed in cylinders, which from the precautions taken in its preparation ought to be free from impurities.

The inhaling apparatus should be as simple in its construction as possible, with openings sufficiently large to permit the patient to breathe with no more exertion than is required in natural respiration. In my own practice we use a large inhaler made of vulcanized rubber, with flexible valves made of rubber-dam. It is necessary to use props to keep the jaws apart. During complete anesthesia the muscular system becomes more or less rigid, and, unless the prop is used, the time necessary for the operation is lost while endeavoring to force the mouth open.

It is desirable also that the chair used for extracting with the gas should have the footstool detached. Patients are sometimes restless, and any movement of the legs or feet upon a stationary footstool will be felt upon the head and upper part of the body, resulting in great interference with the operation. With the stool separate and on casters, it is readily pushed away and the head kept in repose.

With pure gas and a perfect inhaler, together with the foregoing precautions, one is well equipped for a successful administration.

For extracting, it is desirable that the forceps should be so constructed that the operator may stand in one position, and make one pair do as much as possible ; in this way six or seven pairs will be found sufficient for all ordinary purposes. The beaks should be well sharpened, so there will be no slipping ; serrated points and beaks, except in the molar pairs, are of little use in extracting with the gas. You want your forceps so that it will not be necessary to make a second effort upon one tooth.

With these essentials, together with a proper amount of experience in its management, nitrous oxide will justify its claim to being the best anesthetic for dentists' use, for under such conditions you can put your patient to sleep, perform the operation, and have him return to consciousness inside of from one minute and ten to one minute and fifty seconds ; and during this interval, with conditions favorable, the patient will pass into what is to him a pleasant sleep without the least excitement or resistance, and awaken delighted with the result, sometimes declaring he was not cognizant of a moment's unconsciousness, and wondering when and how the tooth could have been extracted without his knowledge. During this short period the operator will have had time to extract from one to twelve, fifteen, or eighteen teeth, according to the character of the teeth and his own dexterity.

Your essayist recently took from a lady, in the presence of her dentist and her family physician, the whole number of the thirty-two teeth ; of these the upper sixth-year molars were decayed to the bifurcations, which necessitated the removal of each of the six roots separately, making the operation equal to thirty-six extractions, while the patient remained unconscious of a single tooth having been taken from her mouth. This case is not cited to claim any superiority in skill or dexterity, but to illustrate what can be accomplished by adopting a system which will enable one to perform as much as possible in the shortest space of time.

I have said these results will appear when conditions are favorable, by which I mean, besides the essentials of pure gas, etc., you must have a patient of good health, whose circulation and respiration are in a condition of normal equilibrium. Under such circumstances the results may nearly always be counted upon as proving satisfactory to both the operator and the patient, and such will appear in the great majority of cases.

While the foregoing is true, it may also occur that some cases may be met in which the results are not entirely satisfactory even to the most experienced operators, or at least require the greatest amount of effort and care to make them so to the patient. The idiosyncrasies of different people are as varied as are the temperaments of the individuals.

The most common of the disagreeable cases are those of overwrought nervous organizations, who, from trepidation in anticipation of the operation, will be under great excitement, but at the same time keep themselves under splendid control until they are recovering, when they will give way unconsciously to more or less violent crying and lamentations; particularly is this the case if the patient has recently been the subject of family bereavement. Others, again, will make such an exhibition just at the point of unconsciousness, and continue until anesthesia is thoroughly produced, when they will become quiet, and remain so until the same point is reached toward recovery. These cases require care to prevent stoppage of respiration by allowing the blood or saliva to flow into the larynx during the paroxysm, otherwise they need cause no anxiety, and they will afterward express satisfaction with having been relieved of the pain of the operation, and soon forget that which was disagreeable.

Besides these, you may meet men upon whom the effects produced will be in keeping with their habits of life; for instance, a policeman may imagine he is about to arrest a desperate character, and will probably mistake the operator for the villain. A trainer of trotting horses may think he is driving his pet horse at a high rate of speed; or you may meet a man of a quarrelsome disposition, and if he be one addicted to the whisky habit, he will be all the more difficult to manage; but they are all easy of control. The excitement lasts but a few seconds, and you want to be prepared to hold them firmly in the chair until they are reasonable, and under no circumstances allow them to get away from you.

The explanation of these phenomena is easily found when we understand how the gas generally produces its effect upon the nervous system.

Dr. Arthur S. Underwood, of London, very aptly illustrates the progressive action of the gas when he says in his notes upon anesthesia that it paralyzes the nerve-centers in a certain order, as follows:

1. The cerebrum, destroying volition so that action is no longer designed or controlled by the intelligence of the individual.

2. The sensory centers of the cord, after which movement is erratic and not even responsive to the sensory stimulus.

3. The motor centers of the cord, after which movement ceases; and lastly, the sensory and motor centers of the medulla, after which respiration, the heart's action, and all the functions of life cease.

Anyone familiar with the progressive effects of the gas will readily recognize the correctness of the foregoing divisions, which explain the phenomena referred to in the cases cited. Take cases of exhibition of grief. The sensory and motor action of the cord being impressed by the weight of mental anxiety from fear of the operation and grief, will give way independent of volition; so also in the cases of the policeman, the trainer, and the fighter. In this condition of cerebral paralysis, while the spinal cord may yet be in its normal state, the reflex impression will cause the patient to cry out and give every indication of suffering pain when the operator begins too soon or continues too long, and yet upon recovery from the effects of the gas he will declare that he was unconscious of anything.

I could relate numerous instances of this condition, but will only mention one, of a servant girl who was to have the two superior wisdom-teeth extracted. After one was removed and the prop taken away, the mouth closed so tightly that it was impossible to get at the other tooth. My assistant commanded her in a loud tone to "open her mouth," which she immediately did, and the tooth was extracted. Upon her recovery she asserted that she knew nothing of the command or the extraction. The sensory and motor nerves were not at that time affected by the gas, while the cerebrum was. With these points in view many of the disagreeable features may be averted, if care be taken not to begin too soon or to continue too long.

These cases constitute the great majority of all that one has to operate for in a general practice which are likely to cause annoyance; but with them all the question of danger can be largely left out of consideration, for with proper care to protect them from accident nothing more serious than the hysterical excitement will occur.

You will, however, occasionally meet a case which will cause you great anxiety, beside exercising your energy to its utmost to bring about a recovery. Fortunately these occurrences are very rare, and as you gain in experience you can make them more and more so.

These conditions are exhibited in cases of constriction of the glottis, or swallowing of the tongue, as it is sometimes called; suspension of breathing; convulsions; heart-depression; and a prolonged narcosis, similar in its expressions to laudanum-poisoning. Of these, the first two are, I think, produced by and dependent upon the condition of

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asphyxia, which I will refer to again, which accompanies the inhalation of the gas.

In cases of constriction of the glottis or swallowing of the tongue, the patient presents an appearance of endeavoring to breathe with violent effort from the diaphragm and chest-muscles, while the passage of air to the larynx is prevented by complete closure. He will become very dark in the face, with eyes protruding, and show signs of rapid strangulation, accompanied with extreme rigidity of the whole muscular system, which adds to the difficulty. This stoppage may be effected by a spasmodic contraction of the palatal and hypoglossi muscles,—drawing the palate closely to the base of the tongue, which is also well drawn toward the throat. This condition is not necessarily alarming, for by pulling the tongue well forward air will pass readily to the lungs and recovery rapidly follow.

The serious cases, however, are those where the contraction includes the whole pharyngeal space about and above the larynx, drawing the tissues over the glottis so tightly that to produce a passage for air seems almost impossible. The remedy is to pull the tongue well out of the mouth with a dry napkin if possible ; or with a tenaculum or tongue-forceps, being sure that the back part of the mouth is free from blood and saliva, then with the fingers upon the roof of the mouth lift the head as though you would raise the whole body. This motion will produce the effect of stretching the neck, and is usually sufficient for relief. In the one case in my experience where this was not effectual, relief was obtained by placing the first and second fingers far down the throat and separating them opposite the glottis. After you have succeeded in admitting air to the lungs, say two or three breaths, the blood assumes its red color, the constriction is relieved ; and if you are strong-nerved and sufficiently composed you can proceed with your operation, and have ample time to complete it before recovery, at which time your patient will have no knowledge of anything having been done or of the precarious position he has been in ; and what is to me the most astonishing thing about it, he seldom feels any ill effects from his strangulation further than, perhaps, a heaviness about the head and a soreness about the throat the next day.

These are cases which will occur less frequently as one becomes familiar with the use and effects of the gas, and yet the peculiarities are such that it would be impossible to describe them so as to enable a novice to avoid them. From experience, one grows to recognize in people idiosyncrasies which are indescribable. I have gone from my office and met people a square away and turned to follow them directly to the house, recognizing the peculiar expression of supplicating timidity, combined with anxiety and suffering. So one can become familiar with the appearance of people in which the different exhibitions of the gas may take place. I have noticed that the men in which the effect occurs (I have never noticed it in a woman) are of medium build, with light florid complexion, exceedingly red lips and mucous surfaces, rims of the eyelids more or less congested, and small or receding chin. These persons show markedly the oxygen starvation which accompanies the inhalation of the gas, and exhibit the muscular contraction and convulsive action very readily.

The second class of cases which exhibits elements of danger is that of suspension of breathing. By this I do not mean the hysterical strain in people who recover with violent crying,—this is more noticeable in children, but seldom goes to a point to excite anxiety,—but the suspension of breathing from physiological causes. Of these, three kinds are recognizable :

The first will take place immediately upon loss of consciousness, and is a repetition of the effects described before, where the patient, from fear or perverseness, has been persuaded against his will to continue breathing the gas. While volition lasts, the sensory and motor ganglia, being as yet unaffected, will carry out the feeling of resistance by a sort of mentality of their own, and breathing will cease ; sometimes this persistence will continue so as almost to produce suffocation. On removing the mouth-piece and pressing a finger against the fauces he will resume respiration with a gasp, and you can proceed with the administration.

The second kind consists of those who exert themselves to breathe immoderately deeply and rapidly, so that when the action of the lungs is no longer controlled by volition breathing will cease from fatigue and rest follow involuntarily for several seconds, sometimes requiring considerable effort to bring about a resumption of the normal action. In both of these cases it is important to recognize early the cause and effect, and to apply the proper remedy promptly, remembering that while respiration is suspended the anesthetic effects are continually increasing, particularly that phase which is produced by what is known as the want of oxidation.

The third state of suspension is produced legitimately by the physiological effects of the gas, and its accompanying asphyxia directly upon the nerves which control the action of the diaphragm and lungs. To my mind this condition is caused more by the apparent asphyxia, or want of oxygen, than by the actual effect of the gas. Of course, an excessive dose of the gas might produce this effect, as it has been reported in most of the cases of death in animals that the lungs ceased their action before the heart ceased beating ; but in the cases to which I refer there will be no indication of an overdose ; in fact, it will sometimes take place before the patient is sufficiently under the influence of the gas to permit of operating.

The appearances presented by persons in whom this phenomenon is likely to take place are sufficiently clear to excite suspicion and to put one on guard, and with these premonitory indications it is usually an easy matter to avoid the point of danger. This suspicion may be aroused by persons of dark-colored blood, as shown at the lips, and 2 you will notice that such people take very slow and shallow inspirations naturally, showing that their blood appears already heavily charged with carbonic acid ; or rather they do not breathe a sufficient amount of oxygen to relieve the blood of its accumulated carbon, and at the first inhalation the dark appearance begins to deepen. They will be in apparently good health, and as far as the lungs are concerned may be entirely free from disease, but are seemingly particularly weak in their breathing function, which will sometimes be as low as twelve or fourteen respirations to the minute. As the effects of the gas progress, the discoloration increases, the breathing grows slower and less deep, and, should you continue the administration, would cease entirely. By a wise dispensation, the admission of atmospheric air to the lungs is the great antidote for the ill effects produced by the gas in these especial cases, so if one grows sufficiently familiar with the indications preceding this effect and admits the air soon enough, respiration will be resumed and no bad result will occur.

Should the respiration cease, then every effort should be made by artificial means to restore it as quickly as possible, remembering that the condition of deoxidation is in a great measure responsible for the effect ; and the heart's action still going on, every second lost adds so much more to the depth of the impression on the nerves already paralyzed.

Several methods of artificial respiration have been recommended. The idea, of course, is to get air to the lungs with as little loss of time in preparation as you can, and before resorting to other methods I would suggest that (your patient sitting in the chair with his feet resting on the footstool) you press the body forward until the chin will come as near the knees as possible. This motion will force the abdominal viscera toward the lungs, thereby emptying them of the gas ; then raise the body to the perpendicular position—keeping the tongue well forward in the meantime—and lift the head and arms, which will tend to inflation ; then again pressing forward to the knees, repeating until the blood begins to assume a red color, when the diaphragm will take up its natural action and recovery will be speedy and complete.

I have said that to my mind these effects are produced more by the accompanying deoxidation of the blood than by the direct effects of the gas ; and it is of interest that we should discuss just what the effects of the gas are and how produced.

There have been different theories upon the subject. First, it was thought to produce anesthesia by overoxidation, because of its containing another equivalent of oxygen as compared with atmospheric air; but it has been shown that it goes into the lungs nitrous oxide and comes out the same, with a decreasing amount of carbonic acid, showing that no separation of the oxygen from the nitrogen takes place. A later theory assumed that the gas possessed no anesthetic properties in itself, but its effects were produced solely by the condition known as the want of oxidation, or deoxidation of the blood.

If such were the case, any agent which would cut off the oxygen supply would produce the same effect; but there is nothing known that will produce a similar result in the like space of time. Probably the most nearly correct theory is, that we have a dual effect produced: one by the gas, which is as pure and legitimate an anesthetic or narcotic as any now known, and we have the accompanying effect of deoxidation, which helps to produce the anesthesia, but which is responsible for the disagreeable symptoms such as the asphyxiating appearance, violent twitching, and convulsive muscular contraction. If we could eliminate that which produces this condition, we would, I think, have all that could be desired in an anesthetic for dental use.

To meet this great desire, it has been suggested that the gas should be mixed with pure oxygen, or diluted with atmospheric air, but I have never learned that these efforts have proven satisfactory.

It is not admissible to previously dilute the gas with air, for the reason that you meet patients of such diverse constitutions that some will fail to come under its influence at all. There are some men who can drink an inordinate amount of whisky with impunity, while others are easily affected with half the amount or less; so you will find it with the gas: some will require a greater quantity than others, and if it is diluted with air complete narcosis is utterly impossible.

However, the evil effects of the lack of oxygen can be mitigated very perceptibly by allowing a small amount of atmospheric air to pass through the nose and between the lips when the inhalation is about half completed; not enough to counteract the effects of the gas, but just sufficient to supply a little oxygen to relieve the intensity of the discoloration, and herein lies the secret of avoiding the dangerous symptoms which I have endeavored to describe in the constricted glottis and suspended breathing. By so doing I have frequently administered the gas in this way to the same patients without the least inclination to contraction or stoppage of respiration. In long operations, where the patient has been under the influence from three to eight or nine minutes, alternating a breath or two of the gas with one of air, there has been but the least discoloration imaginable, and none of the stertor and severe twitching which were shown where the pure gas was given. It is the knowledge of this fact which leads me to condemn the use of the hood or face-piece so much in vogue in Europe, and which I am sorry to see is recommended in this country. You want full view of the lips, so that you may see to what extent discoloration is taking place, which with the mouth-piece and face uncovered can be relieved to a great extent, and that, too, without prolonging the period of inhalation more than a breath or two.

Convulsions will sometimes occur in young persons subject to epilepsy, and it is well to refuse to administer it to those who are liable to frequent attacks, although that fact does not render it certain that such an effect will be produced. In one case in my own experience the young man was sixteen years of age, and had been subject to these fits about every four or five weeks, and it had been just four weeks since his last attack when I successfully gave him the gas. Another case was a boy fourteen years old, who had never had an attack since his fifth year, before which time he was seriously affected by them, and I have never learned that he has had any since ; and yet we have given the gas to probably hundreds who were thus afflicted who in no way exhibited the least sign of anything of the kind.

There is little that you can do in the treatment other than to try and prevent deoxidation of the blood as much as possible, and relieve that which is present by placing the patient upon the floor, resorting to means for producing artificial respiration, and waiting until the spasm is relaxed and breathing is voluntarily resumed. After he has recovered he will feel the usual dullness of intellect, which gradually passes away, and a disposition to sleep, which is permissible.

We have another exhibition which I have spoken of as extended narcosis, resembling laudanum-poisoning. These are cases of hysterical subjects who have catalepsy in addition, and I suppose the condition might be considered perhaps more properly a severe cataleptic fit, produced by the gas, except that it is an effect produced upon the cerebro-spinal system by the action of an agent which is narcotic, and the cataleptic rigidity is wanting. I suppose in the use of any anesthetic or opiate the result would be the same.

No unusual symptom is noticeable during the inhalation, nor until recovery should be looked for ; the blood resumes its natural color, and the heart's action appears to be normal, but respiration will be at this time slightly enfeebled ; the muscular system will be perfectly relaxed, and yet unconsciousness remains. If the patient is undisturbed, respiration gradually becomes slower until it ceases altogether, and I believe life would gradually ebb away. In one case of this kind which occurred in my hands the lady's physician was present, and thought he recognized the attack of catalepsy which he had frequently seen before, and expressed no concern even when suspension of breathing took place, as he remarked that patients of this particular temperament were not apt to hold their breath to the point of suffocation ; but in this instance it continued until the heart showed signs of marked depression, and it required our most strenuous efforts for her resuscitation. The remedies employed were artificial respiration, strong ammonia to the nose, and mustard plaster over the cardiac region. When she had recovered sufficiently to swallow, a generous dose of valerian with three or four drops of laudanum was administered internally, and later the circulation was further assisted by walking, and by rubbing the hands. The resemblance to laudanum-poisoning was recognized when consciousness was partly restored, by the patient resisting every effort made for her relief, and begging to be let alone so that she could go to sleep.

The success attending these cases depends upon the early recognition of the situation, and the promptness with which one employs the measures for their speedy restoration. Fortunately, these occurrences are very rare, as are also the three preceding forms of danger which I have endeavored to describe ; but that they are likely to and do take place is demonstrated by the experience of those who have extensively used the gas, and they constitute to my mind the four classes of dangerous effects in which, should a death occur, no other verdict than "death from the inhalation of nitrous oxide" could be rendered.

I have seen perhaps a dozen cases of constriction of the glottis, nearly a score of suspension of the breathing function, four convulsions, and five or six cataleptic cases. As one gains in experience, he is enabled to avoid almost entirely these risks by the knowledge he has acquired, which causes him first to anticipate the danger, and secondly, being familiar with the indications, avoiding it, as in the cases of constriction and suspension, by admitting a small portion of air to prevent deoxidation ; and in convulsions and prolonged narcosis using great care not to anesthetize the patient further than is just necessary for the purpose. It is better to do less than is desired in instances of this kind, so as not to produce the impression of profound anesthesia.

Other cases requiring special care are persons of large physique and plethoric habit ; persons whose vital force is below par from overwork and worry, or from the effects of the late epidemic la grippe ; intemperate people ; consumptives ; and persons whose heart's action is weak without exhibiting any organic lesion.

In the plethoric habit, the appearance of deoxidation is so marked that it is impossible to carry these patients to the profound anesthetic state you would otherwise do for fear of actual asphyxia, and when you operate in the partial state of anesthesia—that is, when the cerebrum is paralyzed and the sensory and motor ganglia not—the involuntary resistance to the operation is such that an arterial rupture is possible.

In people whose vital force is below par, we must bear in mind that we are depressing a nervous system whose recuperative power is confined to the amount of strength the individual may possess. In such cases, a little sherry wine given as a gentle stimulant immediately before administering the gas is desirable.

Persons at all under the influence of liquor should be refused, not from the fear of danger, but to avoid annoyance, for a nervous system partially narcotized from whisky will become pretty thoroughly so if the effects of the gas or any anesthetic be added.

Consumptives require great care, for the reason that the aerating surface of the lungs is so impaired by disease that the anesthesia progresses for some seconds after the discontinuance of the inhalation; so that in some cases it is necessary to remove the mouth-piece at the moment of unconsciousness or immediately before, and wait until the full force of the gas has been spent before operating.

In cases of weak heart-action the greatest amount of care is needed; as much perhaps in judging when it should be given or whether it should be given at all, as in the administration. In speaking of the weak heart, I do not mean one affected by the different phases of organic disease to which the heart is liable, but where no lesion can be detected, and, indeed, the patient may even be unaware of any functional disturbance.

It is generally conceded that in cases of heart-disease where the patient is in comparatively good health there is less risk attending the administration than doing without it; so it is a matter upon which each operator must decide by his own judgment as to whether the patient would suffer more from the gas than from shock if operated upon without it. But in cases of debilitated heart the administration seems to be attended with some risk, and it has been a matter of great interest to me to understand just what effect is here produced. The patient will seldom exhibit signs of syncope while under the gas, so it is fair to presume that it has not had a depressing effect, and yet when recovering, or shortly after, a feeling of faintness seizes him. In some people who are subject to fainting at the sight of blood this may be expected at this time, but the cases to which I refer were probably never known to faint. This effect is usually seen in patients mostly of fleshy build and of sallow complexion, indicating liver-congestion and consequently vitiated blood. I have seen blood in some patients almost of the consistency of cream in these cases. Under such circumstances the heart is under great exertion at all times to propel the circulation, but particularly so under the nervous excitement from the anticipation of having a tooth extracted, when the pulsations will run up to one hundred and twenty or one hundred and thirty. After the exciting stimulus is removed the heart will fall much below the normal beat, which to my mind seems to be the expression of a demand for a period of rest, and is independent of any physiological effect of the gas. In such cases it is better to administer a light stimulant, and let the patient wait until he becomes more quiet and composed, when the gas may be given and the operation performed with this effect greatly mitigated if not entirely obviated.

In the event of a death taking place, under the circumstances I do not think it could be charged upon the effect of the gas, as from a physiological standpoint the anesthesia has left the nerves of the heart untouched, and the verdict would necessarily be that it was heart-failure caused by debility and excitement, or perhaps shock.

It will never cease to be a matter of wonderment, when we contemplate the thousands who take the gas while they may be unconsciously suffering from some form of heart or other affection, and consider the great nervous tension they labor under both by suffering and loss of rest in addition to the fear of the operation, that cases of death do not frequently occur from tooth-extraction even without taking the gas, for we have numerous instances where sudden fatalities have taken place,—notably Secretary Windom after finishing his post-prandial speech in New York, and the Rev. Dr. Breckinridge at the close of his argument upon the Dr. Briggs case in the Presbyterian Assembly at Detroit. These are happenings which are constantly recurring in every-day life, and there is nothing by which such a condition could be recognized as a warning against administering the gas ; so I repeat that it is a most wonderful thing that such occurrences are not frequent in the dental office.

Now, gentlemen, I have endeavored, though I feel very imperfectly, to describe the principal features of interest in the administration of nitrous oxide gas. I have been compelled to omit much detail for fear of wearying you, and I submit the matter for your discussion.*

ELECTRICITY AS A THERAPEUTIC AGENT IN THE TREATMENT OF HYPEREMIA AND CONGESTION OF THE PULP AND PERIDENTAL MEMBRANE.

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(Read before the American Dental Association, Saratoga Springs, N. Y., August 7, 1891.)

ELECTRO-THERAPEUTICS in medicine and surgery has been developed to a considerable degree, and may be said to form a very large and important element in the treatment of certain forms of disease, while in dental surgery it has received but little attention ; in fact, it is almost a negative quantity in dental literature.

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* For discussion of Dr. Thomas's paper see page 1005 of this issue.

Its application, however, in dental surgery does not offer so broad a field for investigation, yet a study of its value as a remedial agent will be no less interesting than in other special departments of medicine, and when better understood it will, I believe, become an important adjunct to the means already at our command for the treatment of a considerable number of dental and oral diseases.

I have chosen as the special topic of this paper two out of several important pathological conditions of the teeth to which the various forms of treatment by electricity may be beneficially applied. The choice has been governed by a desire to present forms of disease upon which these beneficial results could be most easily and certainly demonstrated.

An exhaustive treatment of the subject at this time and place will be out of the question. I shall therefore refrain from generalities and place my subject before you in outline only, leaving your good sense and experience with disease to fill in the details.

Hyperemia and congestion of the dental pulp from caries, thermal shock, chemical and mechanical irritants, and traumatic injuries, etc., resulting in odontalgia, are among the most common of the diseased conditions found in the oral cavity, and many times the most difficult to control by the methods of treatment usually adopted, without devitalization of the pulp. Hyperemia and congestion of the peridental membrane from constitutional causes, such as rheumatism, gout, and pregnancy, and certain local causes, like excessive malleting, undue wedging, change of position of the teeth in regulating, and other surgical or traumatic injuries, resulting in severe pain, is many times quite as difficult to control.

These forms of disease will best serve our purpose in this attempt to demonstrate the therapeutic value of electric and galvanic currents in the treatment of local disorders of the oral cavity.

The object, of course, in the treatment of these forms of disease is, in the first class, to relieve the congested condition of the blood-vessels and to preserve the vitality of the pulp ; in the other, to arrest the inflammatory symptoms short of the suppurative process or of the formation of adventitious tissue or new growths.

How these much-to-be-desired conditions can be obtained is a question that has often troubled the mind of the thoughtful dentist ; and while I do not claim to have made any new discovery, I am confident that the galvanic current, if judiciously used, will prove to be a valuable aid in the treatment of certain forms of inflammation of the pulp and peridental membrane, and many other conditions which further experience and experiment will demonstrate.

It is a generally-known fact to medical electricians that local hyperemia and anemia can be produced at will by the influence of the negative and positive currents of electricity, and that resorption of certain inflammatory products and new growths can be promoted through their stimulating effect upon the absorbent organs.

It was the knowledge of these facts which led me to investigate the value of the application of these principles to the treatment of congested conditions of the dental pulp and peridental membrane.

The first case upon which I attempted to demonstrate these principles (which will serve as a good illustration) was a tooth in my own mouth, the history of which is as follows : The right first superior bicuspid had been filled with gold at the age of twenty years, but from poor manipulation had been refilled several times during the next fourteen years. Ten years ago the last of these fillings came out, leaving a large disto-approximal cavity, and the pulp nearly exposed. The tooth was exceedingly sensitive to the slightest thermal changes, to acids or sweets ; it was therefore plugged with Hill's stopping. Six years ago this filling was removed with the hope of introducing gold, but the tooth was in such a sensitive condition as to make it unwise to introduce a gold plug ; oxyphosphate cement was therefore substituted. During the following night there were developed marked evidences of a congested condition of the pulp. The next morning the phosphate filling was removed and the cavity dressed with oil of cloves, and a solution of gutta-percha in chloroform was flowed over the bottom of the cavity and refilled with oxyphosphate cement. The symptoms, however, did not abate, but gradually increased in severity. I therefore determined to try the depleting effect of the positive galvanic current, and called upon my friend, Dr. Justin Hayes, of Chicago, with the request that this line of treatment might be thoroughly tried. The positive pole of the continuous galvanic current was applied to the tooth, and the negative pole to the carotid triangle of the neck on the same side. The strength of the current was graduated to my ability to bear it without discomfort, and the poles were allowed to remain in position for about half an hour. At the end of ten minutes there was a marked improvement in the symptoms, and at the end of the half-hour all discomfort in the tooth had disappeared. During the following night the tooth again became uneasy, but a second treatment of about twenty minutes the next morning completely relieved it, and from that time on it has caused me no annoyance. Three years ago the tooth was filled with gold, as a clinic by Dr. Roscoe F. Ludwig, at the International Medical Congress held at Washington, D. C. The pulp is still vital, but is no more susceptible to irritating influences than that of any other tooth in my mouth.

The marked success which followed the treatment of this tooth has led me to adopt the same treatment in several similar cases, all but one of which have responded to my entire satisfaction. This case was one in which there was not much hope of the treatment proving successful, yet it was tried as a forlorn hope. The history is briefly as follows: Miss J. E., aged twenty, of frail, delicate organization, fair health, had been under treatment one year previously for protrusion of the superior anterior teeth. The operation had been performed slowly and with great care to avoid serious irritation of the dental tissues and alveolar processes, and the final retaining-plates had been worn for about six months. About this time a slight discoloration near the gum of the right superior central was discovered. She came in great haste to know why this should occur. There had been no pain in the tooth, and there was no soreness to percussion; it was slightly sensitive to heat and cold, but this symptom was not so marked as in the adjoining teeth. My diagnosis was either passive congestion of the pulp, induced by the irritation in moving the teeth, or the formation of an embolus in the pulp-vessels. Which it was, I was unable to decide, and as there seemed to be no hope of saving the vitality of the pulp by the ordinary methods of treatment, the positive galvanic current was applied. In the treatment of this case I called in council Dr. Plymon Hayes, of Chicago. On the application of the current to the neighboring teeth, three-fourths of a milliampere was all that could be comfortably borne, while the diseased tooth would bear just double this amount. Daily treatments of twenty minutes each were maintained for a week; during the first three days there was a slight increase in the sensation of the tooth under the current, and the strength was reduced to one milliampere; after this, however, sensation seemed to grow gradually less, the current being increased to three milliamperes without unpleasant response. The treatment was therefore abandoned, the tooth tapped, and the pulp removed, and the case treated by the usual methods.

In the treatment of pericementitis not caused by septic poisoning from a devitalized pulp, it is many times of very great benefit. In these cases the positive pole should be applied to the gum over the roots of the affected tooth; marked relief is often experienced in a few minutes, and often entirely relieved after three or four applications.

In a former paper* I have called attention to the prevalence of hyperemic odontalgia frequently accompanying pregnancy, as a result of impeded circulation in the lower extremities and thereby causing general hyperemia of the upper half of the body. The general treatment suggested in that class of cases was rest in the recumbent position, and anodynes. I would now suggest as an additional treatment the local application of the positive galvanic current to the affected teeth.

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* *Journal American Medical Association*, 1889.

With regard to the strength of the current, experience proves that from three-fourths to one and a half milliamperes is sufficient in the class of cases so far mentioned, while the frequency of the sittings will depend upon the severity of the local symptoms and the nervous susceptibility of the individual.

As a rule, one treatment in twenty-four hours is all that will be required ; in aggravated cases two, and occasionally three, may be advisable, the duration of the sittings being from fifteen to thirty minutes.

As a means of diagnosis in obscure cases of the vitality or non-vitality of the dental pulp, I know of nothing so sure to demonstrate to a positive certainty these conditions as the electrical currents, both the galvanic and the faradic. In the more obscure cases, however, the faradic is superior to the galvanic, for if there is the slightest vitality remaining in the pulp it will demonstrate it instantly by causing a response in the tooth. It is superior in this respect to the transmission of light by the electric mouth-lamp, for many times when the condition is upon the border-line between the life and death of the pulp, the electric light fails to satisfactorily demonstrate the condition.

I also believe that the electric currents will serve to demonstrate the presence of low grades of inflammation of the tooth-pulp, so often the cause of various forms of neuralgic conditions of the face and head. The faradic current especially, if applied in such cases, will demonstrate a hypersensitive condition of the tooth-pulp. In order to locate the tooth causing the neuralgia, it will be necessary to apply the current to each individual tooth. The diseased one will give more active response to the current than will the healthy teeth ; in other words, the diseased tooth will not bear so strong a current as will the healthy ones, hence the importance of using the milliamparemeter for measuring the exact strength of the current.

The value of the current in the treatment of neuralgia, paralysis, atrophy of muscles, chronic indurations, tumors, and various other conditions there is not time to detail. We shall therefore leave the matter here, feeling that we have offered a sufficient number of suggestions to stimulate investigation as to the value of electro-therapeutic treatment in the class of cases which have formed the especial topic of this paper.

The battery, milliamparemeter, and the electrode which I use were made for me by the McIntosh Battery and Optical Company, of Chicago.

STATE BOARDS THE PEOPLE'S OFFICERS, AND THE PROFESSION.

BY CHAS. R. E. KOCH, D.D.S., CHICAGO, ILL.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 6, 1891.)

VISIONARIES and poetic idealists may seldom accomplish practical results themselves, but the sentiments kindled by them have frequently been the corner-stones upon which men of a more practical turn of mind have reared strong and enduring structures.

Before this and kindred bodies many Utopian, and what at the present time appear impracticable, ideas have been advanced as to the best means of elevating the educational standard of our profession. The variety of these ideas, and the discussions which have followed them, have established beyond doubt the existence of unanimity on at least one question : that dentists shall be better and more uniformly educated. If we could only stop theorizing, and for the time being submit to the conditions that confront us, we could realize in the near future the desires that now seem so far away in their attainment.

Let us remember that, while we are citizens of the United States, we are also citizens of the several states in which we reside. By the laws of the nation, the right to make their own police regulations for the better security and protection of the citizens has been reserved to the several states.

In nearly all of these states, under this power, the people have enacted laws for the purpose of regulating the practice of dentistry within their own limits. These laws are not designed to benefit the dentist especially ; if they were, they would be class legislation, and, therefore, invalid in most states.

The spirit, if not the letter of these laws, invariably is that the people for whose benefit alone they are enacted should secure a guarantee that the future dentist shall be universally competent beyond the dentist of the past. This is a government for the people as well as by the people, and we must not lose sight of the fact that the people judge us in the aggregate. It has been said that the status of a profession is established by the brightest light within it. The people do not believe this, but they judge a profession by the men they know belonging to it, and are apt to concede to it such respect and esteem as the standard by which they gauge it impresses their minds.

If, therefore, we love and respect our own calling, and have a desire that the laity shall equally respect it, we must labor in the direction of universal education, and of a standard that shall be uniform and sufficient. What the people require, what they have a right to ask of the dentist, and what they have a right to compel regarding him, is not that he shall become a post-graduate of an institution deriving its authority from the national government in addition to that already received from the state government, or that he shall be licensed by a national board ; they are not interested in having a few men reach the zenith of prodigal attainments, but they have a right to demand that all dentists who shall hereafter offer their professional services to them shall commence with such a degree of education and preparation that they, the people, will be secure in trusting the care of their teeth and associate parts to anyone authorized to hold himself out as a dentist.

If we could all agree at the outset that the ultimate destiny of the embryonic dentist is to serve the people,—to serve them intelligently and faithfully,—we shall have adopted a basic principle, and one which alone ought to govern our educators.

The question with the dean of a faculty regarding the matriculant would not be, "Has he the necessary funds to pay his tuition? Has he influential backing?" or, "Is he smart enough to make money so that he will pay his note by and by, if I take this in payment of the fees?" but the only question will be, as in all conscience it should be now in all schools, and as the writer cheerfully admits it is in a few, "Has he the necessary qualifications of mind, body, and soul to serve the people faithfully in this particular sphere?"

If this basic principle is alike adhered to when the time of graduation arrives, the diploma fee will not counterbalance the insufficiency in standing when the minds of the professors are in doubt. If this condition of things were the rule, and the states could compel the professors or faculties to carry it out and to permit none but those especially qualified by experience, study, and peculiar adaptation to occupy the positions of professors, a diploma from a college would not only be a *prima facie*, but an absolute evidence of the holder's qualifications.

The states, in the exercise of their police power, have, however, not interfered in the dental-college business. With few exceptions, they exercise no supervision over the purely business enterprise of educating. They do not appoint, confirm, or examine the teachers ; they simply permit or authorize them to do such teaching as they see fit. In many states the people by their enactments take the position that the work of the colleges must be reviewed by some one authorized as the people's representative. In some states the boards are compelled to issue the license to practice to all who hold diplomas from *reputable* colleges. In the event that the board says a college is not reputable, its graduates cannot be recognized by license to practice. In other states the work of the colleges is reviewed by examinations of all graduates. This, the writer believes, from the standpoint of the people, is the only safe position. It is equitable in every way. A uniform adoption of laws compelling, or at least permitting, the examination of all candidates who desire to begin practice in the future, by the several states, is needed. But much has been accomplished, much more can be accomplished, under conditions of various laws as they now exist.

The large majority of our colleges are private ventures, organized under some loosely-drawn general law. All honor to the men and the institutions whose motive of labor has been first and foremost to educate. They need protecting.

The people cannot distinguish between the college that is incorporated under the same law and conditions, for the ostensible purpose of educating, and which really attempts to do so, and the institution in which education is ostensible only,—which is conducted for "revenue only," and in which men without experience or reputation may be the professors.

In some states the charter for such an institution can be obtained for an exceedingly small sum, and the parties named in the charter are not required to give any evidence that they know anything about the business of educating upon which they are about to enter. "The butcher, the baker, and the candlestick-maker" can be chartered as a dental college, and can issue diplomas, which in some of our states would have lawful standing and could not be questioned.

In most of our states, in order to establish something like uniformity within the limits of each, in the required qualifications of dentists, boards have been established with varying powers in the different states.

These boards are intended for the protection of the people against imposition by dental quacks or pretenders. They are the only representatives of the people and protection of its interests in the matter of the services of the dental profession. They are the only dentists who, as public servants in office, under an obligation of an oath, are responsible to the people for the enforcement of the law and the improvement generally of the dental services furnished the people.

It has been said that men who have never been in a dental college themselves have been appointed on such boards,—that they have been appointed for political reasons where the appointing power rests with the governor, or that they have been appointed because of their skill in manipulation of voters where state societies choose the members of the board. These statements may for argument's sake be admitted to be true. What of it? These boards are created to examine, not to teach. They are intended to enforce the laws. They require strong good sense, a knowledge of the laws, and a courage that shall give them power to enforce these laws on the part of their individual members.

The manner of selection of our judiciary is open to objection in the same way, yet it is a question if for that reason there is a single sensible man in the United States who disregards the decrees of our courts.

Personally, the writer does not now recall a single appointment on a state board of dental examiners in which the appointee was not well and favorably known in his profession in his own state. While under their oath of office, members of the boards are first and foremost the executive officers of the laws of their respective states; they are, secondarily, also the intelligent lovers of the profession which had honored them before the state executives did. Is it unreasonable to believe that men who are guided by an accumulated love of many years, who have had the affection and friendship of their progressive confrères, to which is to be added the conscientious sense of official duty, will do aught that is not in the direction of the elevation of the profession? Is it not reasonable to credit men who have nothing to gain except by a faithful discharge of duty, whose field of operation is broad,—the members of boards,—with more circumspection than that of the professors of any college, who must more or less be guided by questions of finance, and whose interest is, largely of necessity, concentrated within the walls of their own institutions?

It is far from the writer's intention to belittle the noble efforts that have been made by a grand galaxy of magnificent teachers, who have honestly, earnestly, courageously, and studiously labored to put our calling in the category of the learned professions. It is as much due to them that they should be separated from the degradation of disqualified pretenders as it is due to the profession generally. The various state boards, within the sphere in which they lawfully exercise their functions, will accomplish this if the friends of progress will lend them their unstinted aid and support.

It must be borne in mind that dental colleges have increased to an unreasonable extent since the people have generally begun to legislate in this matter. We have now nearly as many colleges in the land as there were annual graduates thirty years ago. Commercially speaking, the will of the people as expressed by law created a market for the product of the dental colleges.

Is it incompatible with this condition of things that the people should demand a standard quality in the manufacture?

There are, in all communities, people who are at all times "agin the government." They oppose law because it is law.

There is also a class who are willing to see the law enforced against their neighbors, but complain of despotism if an executive calls their attention to their own transgression. Boards everywhere will tell you that the dental community has representatives of both these classes. There is a large variation in the provisions of the laws of the states on this subject, and a great many friends of progress think it is impossible to accomplish anything until this whole matter shall be controlled by a national board. It may be well to hope for, to work for a better machinery with which to do this work, but it seems to the writer extremely doubtful, providing this Utopian wish could be realized, if such a board would not be liable to the same objections, the same criticisms, and the same blocking of wheels that is now endured by the several boards.

A national board, while our political complexion is as now, is of course out of the question. There are matters of greater public concern than ours that need uniform national legislation, but which are left to the several states to care for. Take, for instance, the question of marriage and divorce. It is impossible to obtain national enactment in a matter involving the most serious social and property relations of the entire population.

Had the early practitioners abstained from operating with the use of napkins, duct-compressors, tongue-holders, and similar appliances because their difficulties of operation were great, and said, "Wait till Dr. Barnum shall give us his great discovery," they would have been about on a parallel line with our friends who deem our present boards useless, ineffectual, and impotent, and who appear to be awaiting the consummation of plans which they elaborate in their minds only.

It is common sense to accomplish the best results with the opportunities you have,—to use the tools at your command in such a manner as to secure the best possible result attainable with them.

Gentlemen of the Association, we are all—practitioners, professors, and members of dental boards—brothers in one great family. We should all lend our energies in one direction. The future children of this family must be educated on a higher plane than their sires. The very small minority of this family, during a brief period, has been designated by the people to supervise that education. They are by law empowered, in some instances, if they are satisfied that your schools are not sufficient or satisfactory, to designate them as not reputable, in which case the product of that school—its graduates—is denied the privilege of practicing in those states. In other states the product of all schools must pass muster, be inspected, and approved of by their boards before it can enter the profession of those states.

There is no reason why your brethren in office everywhere, who must sooner or later retire and be followed by others of you, should not receive the heartiest support from every practitioner who loves his profession, and from every professor who is such for the purpose of educating the future dentist first, and for all other reasons incidentally only.

Four years of membership on a dental board has taught the writer the perplexities resulting from a lack of uniformity in laws, and from their insufficiency to enforce both their letter and their spirit; but as this will probably be the last time that he can speak to you as a public officer, by reason of his becoming a private citizen before this association shall meet again, he feels it incumbent upon him to testify from his experience and observation to the good that even faulty and dissimilar laws have accomplished ; to urge upon you in your individual capacities to sustain to your utmost ability both the law and its chosen executives ; to assure you that while you are as earnest in the desire for progress as they are, they occupy a position for the time being which forces them to see more than you. They can accomplish more, having your moral support, than they can without it. We are not living, as some would have us believe, in a state of war of a triangular kind—the practitioners, the faculties, and the boards each occupying a different and a hostile camp. We are a trinity,—three in one.

The recruiting of the profession must be done with greater circumspection than in the past by the colleges.

The boards must see that the colleges do this. Honorable colleges, honorable professors, will need no exercise, or attempt at exercise, of such power as the law may give the several boards, and if the boards in the exercise of fidelity to their oath of office and love of their profession are compelled to exercise the powers vested in them, all good men everywhere should sustain them. The penalties of law are never incurred by the law-abiding. If the position that has frequently been taken, that members of the boards are often themselves unfit to act as examiners, be true, I wish to say to you, lend your aid with these imperfect tools to construct better material for the future years. If none but competent dentists hereafter can begin to practice, it will be impossible in a few years for any governor to appoint an incompetent man on these boards.

The writer has no thought of attempting to weary this association, but he is quite sure that many of you have never had your minds directed to the fact that you exercise your functions and discharge the obligations of your practices simply by the license of the people. Whether this license is a visible document or not, does not alter the fact.

Because the people, in the earlier history of the country, when it was less densely settled, did not see fit to assert their right of police regulation in matters that refer to the physical or moral health, does not prove that they had no such right.

The holding of a diploma brings no vested right with it excepting when and where it is conceded by law. The people have a right to demand, if they see fit, that the physician, the pharmaceutist, the dentist, the lawyer, the teacher, shall have the necessary qualifications to discharge their duty, and in many states this right is asserted.

If the people, so far as dentistry is concerned, should not recognize any diploma whatsoever, but force every new candidate for practice to take an examination before a board, they would follow out the practice existing in older countries, they would secure a better educated class of professional men, and they would strengthen and encourage our best colleges to better work. The indifferent institutions and indifferent teachers would speedily have to go into voluntary or involuntary liquidation, because there would be no longer any market for their manufacture.

The writer has met the objection that he is abrogating unto himself, or his class (members of state boards), greater knowledge and circumspection than that possessed by professors and faculties, while the fact is said to be the opposite ; and therefore the decree of a faculty ought to have more potency than the decree of a board.

We graduate from our state and city schools men in various departments of learning, yet their diplomas are not recognized by school boards, but an examination is required before the graduate can practice the profession of teaching. These schools are organized and conducted at public cost, and yet the public is not satisfied with the evidence borne upon a diploma, but requires a further examination by a board outside of the faculty that taught.

On the other hand, nearly all our medical, dental, and pharmaceutical schools are private enterprises,—the diploma and tuition are both issued for a consideration,—and it does not seem unreasonable if the people, having the right so to do, see fit through their officers to verify the qualifications of graduates as certified to on their diplomas. The public would certainly be expected to place more weight upon a certificate bearing the signatures of its own officers than upon that of a number of private individuals, be they ever so exalted, who cannot divest themselves of the implication of conducting a college for personal gain.

In conclusion, the writer desires to express the wish that dentists generally would take a greater interest in the duties and trials and vexations that come to members of state boards in the discharge of their duty ; that they would learn the peculiar legal positions and requirements of their profession in their own states ; that they would strengthen the hands of their confrères who for the time being are in office. If we all would do this, our profession would be more respected ; the people, whose voice and will in this country have supreme potency, would be better served, and when we finally lay down the forceps, the plugger, and the mallet, our consciences will tell us that we have laid aside our selfish ambitions, and individual glorification, in the cause of the general good.

SOME ORAL SEQUELAE OF LA GRIPPE.

BY R. G. RICHTER, D.D.S., MILWAUKEE, WIS.

(Read before the Wisconsin State Dental Society, July 21, 1891.)

THE medical world has not yet determined the etiology of la grippe. At first it was believed to be the effect of a germ, and until recently this theory prevailed. Later investigations tend to prove that it is of a miasmatic nature, which seems most plausible, as it very closely resembles malarial fever. If it is due to a germ, it would certainly be contagious, like diphtheria, scarlet fever, and kindred diseases. It is a well-known fact, however, that it is not contagious, but infectious, which would indicate the miasmatic nature of the disease. Whatever the cause may be, the fact remains that it takes a terrible hold upon the system and often with fatal results. It also affects the glandular and nervous system, in fact all the tissues, and leads to no end of complications.

From my own experience and that of physicians and specialists, I find that the effects of it are to intensify any pathological condition, either systemic or local, that may be present. Its local expression occurs generally at the most vulnerable point. But as it is not of the general but of some of the after-effects, as they appear to the dentist, that I wish to write, I will proceed to state how my attention was first drawn in that direction.

During and after the epidemic of la grippe a year ago last winter I had several cases of acute gingivitis under my care that differed very much from the usual cases we have to treat, as I shall explain farther on.

The first case was that of a young lady whose teeth I had taken care of for a number of years; she has always been very particular about her mouth and teeth, and so far as cleanliness was concerned it would be hard to find a mouth that was in better condition. Her health and the secretions of her mouth were perfect, and tartar had never formed on her teeth. She came to me crying one morning n the most intense agony; one side of her mouth was so sore, she said, that she could not take any nourishment on account of the pain produced when anything touched her gums. Upon examination, I found on the left side of her lower jaw, from the lateral incisor to the second molar, the gums intensely tumefied nearly up to a level with the cutting-edges and grinding-surfaces, and extremely sensitive to the slightest touch. I took it for a case of local poisoning, but as she was suffering extreme pain, my efforts were first directed to relieve her of that. I tried cocaine, with hardly any beneficial result; then with a fine hypodermic point I tried all the different remedies at hand, but could get no action; and the introduction of even the finest point caused her a great deal of pain. So I resolved to try the heroic measure of depleting the gums by lancing. Relief came after about twenty minutes of rinsing with warm, carbolized water, which aided the flow of blood until the gums were fully depleted. I then punctured the gum-tissue with aconite and iodine, prescribed a mouth-wash, and directed her to come again the following day. She duly made her appearance as directed, and I found the gums in a comparatively fair condition. They were a little puffy and swollen between the teeth, but I could insert the point of the needle in them without much pain. The necks of the teeth were perfectly smooth and free from deposits. I injected peroxide of hydrogen, scarified the gums with the sharp needle-point, and followed this by an application of a ten per cent. solution of resorcin. This treatment was continued for five days, when I dismissed her, as I supposed, cured ; for the gums seemed to be in a perfectly normal condition.

About ten days later she came in again with the same trouble, but this time it was in the gums around the right superior teeth from the cuspid to the third molar. I thought she must have poisoned her gums in some way, possibly by the use of chewing-gum or some patent dentifrice. She told me she never chewed gum, and only used prepared chalk to clean her teeth. I questioned her about food and medicines ; in fact, everything I could think of, but found nothing that would bear me out in my suspicion of local poisoning. I pursued the same treatment as before, and was endeavoring to discover some cause for this peculiar condition, when a few days later a physician, who was a personal friend, came hobbling into my office with a crutch and a cane. La grippe, from which he had been suffering for six weeks, had left him in a terrible condition ; he was a pitiable sight to behold.

When he took the chair, he said, "I fear I shall have to lose my teeth ; I have not been able to close my mouth or eat anything for two days." Upon examination, I found the same condition of the gums as in the first patient, though in a greater degree, the gums being affected around all the teeth, both superior and inferior, and there was also a deposit of tartar around the necks of most of them. The gums in this case were purple and hypersensitive, and around some of the teeth pus flowed from the necks upon pressure ; the whole mouth was feverish and dry. It was extremely difficult to treat this case, on account of the intense pain in the affected tissues and the reduced condition of the patient. The treatment in the main was the same as in the former case ; but it was two weeks before the operation of removing the tartar could be performed ; after which the cure was easily effected, assisted greatly no doubt by the improved condition of the patient, who by this time was regaining health rapidly.

During my conversations with him, and while he was telling me how the disease had affected his feet and different parts of his anatomy, the idea occurred to me that la grippe might possibly be the cause of this severe, acute gingivitis, the gums in this case being a vulnerable point, on account of the irritating effect of the tartar and the slight inflammation that must have been present before he was taken sick ; this suspicion was greatly strengthened when my first patient told me that she had suffered from an attack of la grippe for two weeks before she came to see me.

After these, several other cases of a similar nature came under my care, and in each case I found that the patient had been a sufferer from the prevailing epidemic. There is one case which occurred last May that I wish to relate, as it illustrates the powerful effect of la grippe, even when the patient has had only a slight attack.

A young lady who was about to start on a trip abroad had her teeth examined before going. Her mouth was in a perfect condition ; she was to start in about ten days. The epidemic was prevalent at that time, and she was taken down with it for only one day. On the second day following I was called to her house, and found her gums in an acute state of inflammation. While I was there her physician called. I told him I thought it was an after-effect of la grippe, and suggested the administration of tonics with a view to strengthening the system. He diagnosed the trouble as a simple case of indigestion. I treated the local condition by injecting peroxide of hydrogen, at the same time scarifying the gums with the sharp point of a hypodermic syringe. As there was no time to be lost, I advised that the patient be treated constitutionally. The family finally yielded to this, a physician and friend of mine was called, and together we got her so she could undertake the trip in just four days. The gums were not entirely cured, but, as the berths were engaged, she started with a mouth-wash and a box of powders. When she reached New York she wrote me stating that she was all right, and would start the following Wednesday. I consider this a peculiar case, inasmuch as the patient had been ill only one day ; yet the gingivitis was as intense as in the case of a great many who had been laid up for weeks with this disease.

So much for gingivitis as an after-effect. Of the other after-effects there is probably none more difficult for the physician to deal with than that upon the nervous system and the accompanying neuralgic pains. Of all the nerves of the system, the fifth pair are more liable to irritation than any of the others. This is the great sensitive nerve of the head and face, and is peculiar in the respect that it supplies parts with filaments of sensation, with filaments of motion, and through one of its branches, the gustatory, with filaments that pertain to the special sense of taste. All these filaments are liable to irritation, but none so much as those of sensation. From first dentition in the infant to the loss of the teeth in old age, they are, in ninety-nine cases out of a hundred, a medium of irritation, to say nothing of the irritations this nerve is liable to receive from other causes.

The fact that the fifth nerve receives so much irritation makes it a vulnerable point of attack for this disease, and this will explain why we so often have neuralgia of some of its branches as an after-effect. The physician whom I mentioned in the early part of this paper stated to me that every severe case that came under his care was accompanied by trigeminal neuralgia. Now, as the after-effects make themselves felt for a long time after the patient is considered cured, these neuralgic pains may become a puzzle to the dentist.

When these cases come under our care, the patient generally complains of pain in some particular tooth, which very often, when examined, presents a perfectly healthy appearance ; it may possibly have a small crown filling. I will not take into consideration defective teeth, which are themselves a cause of trouble, but to illustrate my point will take such teeth as those in which, after excluding all other causes of odontalgia, the trouble is found to be caused either by pulp-nodules or by exostosis of the root. A case that came to a brother practitioner will illustrate this.

The patient complained of severe pain in the left first superior molar. Her suffering was so great that she had not slept all night. The tooth had a medium-sized filling on the grinding-surface, but otherwise seemed normal. He asked me to make an examination and try to relieve her, as she was suffering severely and his treatment so far had been ineffectual. He had destroyed and removed the pulp, and when she came to me I removed the dressing and found the work had been perfectly accomplished. The canals were clean up to the apical foramina, and the dressing came out white and dry. On questioning, I found he had tried all the remedies that I usually resort to, so I dressed the canals with chloroform, carbolic acid, and iodine, using a fine gold point to carry the dressing well up, and punctured the gums over the root with aconite and iodine. After half an hour's waiting, the pains were as severe as they had been for four or five days previously. Not finding any apparent cause for this trouble, I questioned her about la grippe, and found she had had a very severe attack for two weeks. Then I made up my mind that it was a case of neuralgia as an after-effect of the disease. The reason that it affected the first molar in this case may be due to the fact that the roots penetrated the antrum, and that catarrh of the mucous membrane probably had irritated the nerves in some indirect way and made them a vulnerable point ; or possibly the effect was due to some irritant to the posterior dental nerve.

These neuralgic pains are very puzzling, and since I have been investigating I find that they are of quite frequent occurrence. When there is no good cause to be found for them in the teeth, and the patient has suffered with la grippe, it is a case for the physician and not for the dentist to treat.

The other effects are manifold and of less frequent occurrence; probably none of them are more troublesome than those upon alveolar abscess, or the treatment of caries of the maxillary bones. In such cases there seems to be a sluggishness and indisposition to heal; medicines do not have the usual effect, and healthy granulation is very slow.

I have two cases that will illustrate this point. The temperament of the patients in both is alike, and there is only about five years' difference in their ages. In both cases I amputated the ends of the roots and removed the carious bone; one of the teeth is the second bicuspid, and the other is the lateral incisor. I operated first on the incisor, then on the second bicuspid two weeks later. The bone has re-formed over the second bicuspid. The other case in which the patient had la grippe I am still treating. The bone is re-forming, but very slowly.

RARE DENTAL ANOMALIES.

BY FRANK ABBOTT, M.D., NEW YORK, N. Y.

I. Two Lower Incisors fused together at their Crowns and Necks.

FIG. 1 represents this peculiar anomaly, which undoubtedly originated in the earliest stages of the formation of both enamel and dentine.

a is the labial surface, on which we recognize a vertical furrow corresponding to the place of fusion of the incisors, interrupted upon the crown by a carious cavity, invading both crowns simultaneously, and extending downward into the region of the neck, where the fusion terminates in the cementum. The furrow is sharply defined and abrupt at the crown, producing a slightly-marked ridge at the cutting-edge and becoming shallow toward the neck. The roots are seen spreading more and more from the necks to their apices.

b represents the lingual surface, which shows a marked elevation of the enamel at the line of junction. This elevation is a somewhat hypertrophied edge of one of the crowns, and cannot be called a new formation of enamel, as spoken of by authors under the name of "enamel drops" or "ameloma."

A fusion of the crowns as seen in this case must be the result of a fusion of two enamel-organs and the corresponding two papillæ.

Since we are at a loss to determine the time when the enamel-organs of permanent teeth are formed, we are unable to indicate the period in extra-uterine life at which this anomaly could have originated, or what could have caused it.

II. Union of a Portion of the Crown at an Obtuse Angle with the Rest of the Crown and Root of an Upper Lateral Incisor.

Fig. 2 is a representation of this remarkable pathological specimen, which very probably finds its explanation in a fracture or breach of the crown shortly after its formation, while still covered with soft tissue.

a illustrates the labial surface, on which we recognize a well-pronounced transverse ridge, leading to a small carious cavity. Below the ridge the crown is built normally. About it there is slight hyperplasia of the enamel, extending to the region of the neck. The root is small and short, with the apex imperfectly developed, indicating that the tooth was removed before its complete formation.

FIG. 1.

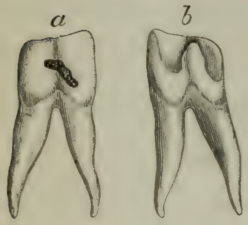


FIG. 2.

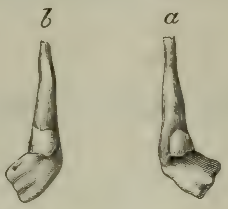
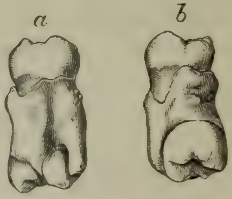


FIG. 3.



b represents the palatal aspect; here the transverse ridge is plainly visible, though less pronounced than on the labial portion. The approximal edge of the slanting crown exhibits a small carious cavity; above the ridge the enamel appears to be slightly hyperplastic, and terminates in a bulging line toward the distal surface. In this situation there is a layer of apparently thin enamel, covered with cement-tissue rather nodular in its appearance.

This tooth was removed from the mouth of a girl about eight years of age, on account of the annoyance its appearance, etc., caused. There seems but one way to explain this anomaly, viz: a breach in the continuity of the crown by some local mechanical injury. The subsequent inflammation has caused a partial hyperplasia and a slight atrophy of the enamel, at the place overlapped by the cementum and at a corresponding point on the opposite side of the tooth.

The hyperplasia of the enamel we could account for by the irritation following the breach at the labial and palatal aspects; but the atrophy seems explicable only by assuming a tension of the enamel-organ at the mesial and its compression at the distal surface.

This injury must have occurred before the enamel was fully formed, and prevented the complete development of the neck-layers.

III. Fusion of the Second Lower Molar with the Third Molar or Wisdom-Tooth by Hyperplastic Cementum.

Fig. 3 illustrates this anomaly, the clinical history of which is unknown. *a* is the buccal and *b* the lingual aspect.

A fully-developed crown of a second molar, with one root fairly recognizable, is united with the third molar in a vertical direction by means of a hyperplastic nodular cementum, the boundaries of which reach the neck of the second and the crown of the third molar. Evidently we have here a misplacement of the enamel-organ and the papilla of the third molar, and situated directly under and in an opposite direction from those of the second. The germs of these teeth were evidently not near enough to one another to interfere with the formation of their crowns, but as the roots began to develop a fusion took place, and the irritation thus produced must have led to the hyperplasia of the cementum, which closely resembles that of hyperostosis of roots of teeth generally.

HISTORICAL ADDRESS.

BY ELBRIDGE BACON, D.D.S., PRESIDENT OF THE MAINE DENTAL SOCIETY.

GENTLEMEN : We have assembled on our twenty-fifth anniversary, meeting here in Brunswick where our society was organized and held its first session. It seems to justify some congratulation on our part that we have completed the first quarter of a century with a reasonably prosperous society, that has steadily held its way, increasing in numbers and influence and with a good promise of future usefulness. While we have made a large advance from our beginning, we have a liberal margin for further progress.

Something of the history of our society belongs to the present occasion, and perhaps a brief summary of the history of the first dental society, the pioneer in a movement so beneficial both to us and our patients, may be of interest at the present time, as well as such scanty records as I have been able to find, of three other societies, not included in the list of those regularly organized.

In Dr. Spooner's work, entitled "A Guide to Sound Teeth," published in New York in 1836, it is stated in a note on page 122, that "the educated dentists of New York were endeavoring to elevate their profession to its proper rank and usefulness ; that a society of dental surgeons had been formed, and a library was being established,'' with further statements of what they intended to do; but I presume their good intentions were not realized, as I have not been able to find any account of other transactions, or that the society had any further existence.

The next society was the New York Society of Dental Surgeons, that held its meetings in New York City, it is supposed about 1837. This society formed an auxiliary, ''The Dental Society of Western New York,'' which passed a resolution in favor of the establishment of the *American Journal of Dental Science.* The resolution was published in the first issue of that journal in 1839. This includes all I have been able to learn of the transactions of either of these societies. They left no other records, and probably held only a few informal meetings; but I have thought them worthy of mention as indicating a change beginning in the minds of some of the dentists of that time, and leading to more successful efforts.

The first regularly constituted dental society in this country was the American Society of Dental Surgeons, organized as a national society in New York City, August 18, 1840.

The history of this society is especially interesting, and deserves a fuller summary than my limits will allow. I can only give an idea of its objects, with such of its transactions as were the occasion of its unpleasant experience, and finally the cause of its dissolution. The formation of this society was the result of long and persevering labor by a few leading dentists, among whom Dr. Hayden, their first president, was the most persistent. He had tried to interest others in the subject nearly twenty years before, but at that time the idea of forming a dental society was dismissed as altogether impracticable. He, however, continued his efforts, but, in addition to the indifference (existing at all times), some objections were made, the principal one being the community of knowledge; but the society once formed, the dreaded knowledge in common was found to work no more serious injury than a general leveling upward.

Its constitution consisted of fifteen articles, the first one stating its object to be ''The promotion of union and harmony among respectable dental surgeons, and to give character and respectability to the profession, by distinguishing between the meritorious and skillful and the impudent empiric.'' Another of its articles provided for aid to be given to widows and orphans of any deceased member, or to any living member reduced to want by sickness or other calamity. Seven members beside the president made a quorum.

The entrance fee for a candidate examined and admitted to membership was twenty-five dollars, to be paid before receiving his diploma. Those becoming active members by election paid ten dollars, and were entitled to a diploma. The annual dues were five dollars, but at their seventh meeting this was changed to two dollars and a half. New members were elected by a vote of two-thirds of the members present, the candidates to be twenty-one years of age, have a good English education, a good moral character, and to have studied and practiced two full years with some practical dentist, known to be such by the society.

At their second meeting they took charge of the *American Journal of Dental Science*, that had been published the year before by three gentlemen (now members of the society), which they edited and managed for the next ten years, when it was transferred to the late Professor Harris as a private enterprise.

At this meeting, a subject, ever present afterward, was introduced in a letter by the following question: "Are there cases where it is essentially advisable and important that teeth should be filled in which gold foil cannot be used, and other articles be substituted, so as to preserve the teeth a sufficient time to compensate for the operation?" On this question a committee was appointed to take action, which reported as follows: "That the use of lithodion, mineral paste, and all other substances in which mercury is an ingredient is injurious to the teeth, and that there is no tooth in which caries in it can be arrested and the organ rendered serviceable by being filled, in which gold cannot be employed."

This report was unanimously accepted, but, as will be seen, was nearer the beginning than the end of trouble. At their fourth meeting, in 1843, they passed a resolution declaring the use of amalgam to be malpractice. This did not accomplish the object, and at the next meeting the secretary was directed to notify every member that the use of amalgam had been declared to be malpractice, and that hereafter any member persisting in its use would have his case acted on by the society. As this notification did not at all diminish the use of the prohibited article, they passed at their sixth meeting, in 1845, a resolution directing the secretary to send to every member the remarkable "Pledge and Protest" that resulted in what is known as the "Amalgam War." This pledge required every member to certify "That in his opinion any amalgam whatever, under any of its different names, is an unfit material for filling teeth," and to pledge himself never, under any circumstances, to use it in his practice as a dental surgeon, and also to join the society in protesting against its use. Of the society's one hundred and thirty-four members, seventy-eight either signed the pledge or signified their acceptance of its provisions, three refused to sign the pledge, and fifty-three returned no answer.

At the eighth meeting, in 1847, the secretary reported that the number of delinquents was reduced to twenty-one. Of these, eleven were expelled, one resigned, one was dropped for non-payment of dues, and the others were laid over for the next meeting. The number of members present was twenty-eight, the number expelled being over one-third of the convention. Their numbers were still further diminished by the voluntary withdrawal of other members, and many of those remaining had now become convinced that a mistake had been made, and wished to remedy it by rescinding the pledge. At the eleventh meeting, at Saratoga, the committee appointed at the previous meeting reported in favor of repealing the "Pledge and Protest," and the report was unanimously accepted.

The committee gave their reasons for their report in over eight pages, and among other reasons said, "That the formation of this society was the first attempt to run a clear line of discrimination between men of competent attainments and the impudent empiric, and that respectable qualifications be better distinguished from unwarranted pretensions." This, and much more of the report, was true enough, but the further declaration that the pledge had fulfilled its office and served its turn, and therefore might be honorably rescinded, instead of admitting their mistake, disappointed their friends and gave serious offense. The further statement that they still believed its use to be malpractice did not tend to restore harmony, as many had been experimenting successfully with it, and could not be convinced that saving teeth with amalgam was malpractice while there was no proof of injury to the patient.

I have seen no statement of the numbers present at the next four meetings, but those still remaining read interesting papers and had discussions without much friction, but it had become evident that the numbers remaining were not sufficient to make it an object to continue the society. At the fifteenth meeting the subject of a dissolution was brought up, and another meeting appointed in Philadelphia, in August of the same year, and a committee appointed to report upon the propriety of dissolving the society. At this meeting there were ten members present, and the committee reported that they deemed it inexpedient to dissolve the society at present, and asked leave to report at the next annual meeting. This report was finally accepted and leave granted.

At the next annual meeting, on the first Tuesday in August, 1856, at the Astor House, New York, there was no quorum present, and they adjourned to three o'clock P.M., when they again met with the same result. The secretary was then requested to notify all the members that could be reached in time, that a meeting would be held on Thursday morning at nine o'clock, at Hope Chapel, Broadway, for the purpose of finally deciding whether they should dissolve the society. They met at Hope Chapel according to adjournment, with nine members present. The minutes of the last meeting were read and accepted, but the society refused to transact any other business before hearing the report of the committee in relation to the dissolution of the society. This report was as follows: "*Resolved*, That we deem it expedient to dissolve this association, and that it be and is hereby adjourned *sine die*." This report was accepted, and the society dissolved.

The life of this society, which lasted sixteen years, though not altogether happy, was useful, not only as a pioneer, but in other ways as well. While we blame their stubborn prejudices, we must commend the courage and industry with which they formed the first dental society ever regularly organized in any country, and, in addition to a full average of society work, edited and managed for ten years the first dental journal ever published. If we remember their mistakes, their enterprise and public spirit should not be forgotten.

The next three societies being in some respects pioneers, I shall in passing simply notice what was peculiar to each one, and include the American Dental Convention.

It was more than two years after the formation of the first society before the second, the Virginia Society of Surgeon Dentists, was organized in Richmond, Va., December 12, 1842. This was the first society that had a charter. It passed a resolution declaring the use of amalgam to be malpractice, but exacted no pledge other than such as exists among honorable men; but it became involved in the amalgam war, and this, in addition to an unfortunate difference existing among some of their members, resulted in an interregnum which was lengthened by the civil war; yet the society had not been dissolved, as has been supposed, but with the return of peace resumed its meetings, and is now a live and prosperous society.

It was nearly two more years before the third society, the Mississippi Valley Association of Dental Surgeons, was organized in Cincinnati, O., August 13, 1844. This has been considered the oldest society now in existence, but as the Virginia Society still lives, that is the oldest, unless its interregnum should deprive it of that distinction. This was the first society that did not have the suppression of quackery one of its expressed objects. It, however, passed a resolution against the use of amalgam, which was said to be the only resolution that it failed to keep. At the eighth meeting the question of dental patents came near being as fatal to this society as the amalgam question was to the first. After an earnest discussion, the question of dissolution came up for action, when the member offering it asked leave to withdraw it. This was granted, and the society continued.

More than another year passed before the fourth society, the Pennsylvania Association of Dental Surgeons, was organized in Philadelphia, December 15, 1845. This was the first society that did not, among its first acts, condemn the use of amalgam. Its meetings were quarterly for nearly twenty years, when it was the first society to establish and maintain monthly meetings. It has been credited with an unusual amount of quiet and effective work.

The American Dental Convention, although the ninth in course of time, was in some measure a successor to the first society, many of its members being active in its formation the year before the first society was dissolved. It tried to avoid the evils of too much government by going to the other extreme. This "Democratic Dental Convention," as one of its members called it, was to have as few rules as could possibly hold a body of men together. On the president deciding a motion to be unconstitutional by the third and fourth articles of association, a motion to suspend these articles was urged by several members, and adopted.

At their first meeting in Philadelphia, in August, 1855, eighty-two members signed the articles of association which they had adopted instead of a constitution. They had no treasurer, the recording secretary being required to report an account of expenses to the convention on the last day of the session, and pay them by a *pro rata* assessment on the members present. At their second meeting the next year at Hope Chapel, New York, one hundred and eighty-six members were present, representing twenty states, the District of Columbia, and Cuba. It was estimated that as many as two hundred and twenty-five were present on the second day, the names of the one hundred and eighty-six not being taken till the third day, after many had left the convention. The proceedings of the three days' session, reported in the *American Journal of Dental Science*, extended over sixty-five pages, the meeting being very enthusiastic and harmonious. The same spirit prevailed at their third meeting in Boston, August 4, 1857, twenty-three states being represented by one hundred and eighty-five members. The convention continued four days, and their transactions were reported in the *Dental News Letter* in nearly seventy pages. Several other sessions followed in the same spirit. This high tide, however, was followed by an ebb, but the society kept afloat and filled a useful place among societies for nearly or quite the first quarter of a century.

The formation of societies was continued until, in September, 1866, there had been organized forty-seven societies. At this time the idea of forming a dental society in Maine was more or less in the minds of some of the dentists in different parts of the state; but nothing had been done, when Dr. A. K. Gilmore took the initiative, and sent a circular letter to every dentist in the state of whom he had any knowledge, having first obtained the names of ten other dentists which were added to the call, "for the purpose of forming a dental society, to cultivate the science and art of dentistry, to elevate and sustain the professional character of dentists, to promote among them mutual improvement and good will, and to solicit the attendance of the dentists of Maine at the New Medical Building, Brunswick, on Tuesday, September 25, 1866, at half-past ten o'clock A.M.''

Fourteen of the dentists invited accepted the invitation, nine of whom met at the time and place named. The convention then proceeded to organize the Maine Dental Society, with Elbridge Bacon, president; William Randell, vice-president; Thomas Fillebrown, recording secretary; Alvin K. Gilmore, corresponding secretary; James B. Fillebrown, treasurer; A. K. Gilmore, Thomas Haley, C. N. Peirce, D. S. Granden, G. W. Reed, executive committee.

Our constitution and by-laws have had a few changes. At first our admission fee was three dollars. In 1868 some diplomas or certificates of membership had been obtained, for which three dollars additional to the admission fee was charged. In 1870 the admission fee was changed to five dollars, the diploma being included. The yearly dues were two dollars until 1875, when they were changed to one dollar. After a few meetings the office of corresponding secretary was dropped, and its duties assigned to the recording secretary. In 1874 a microscope was purchased, and I respectfully suggest what our young, progressive members will be glad to know, that this microscope with all its belongings (notwithstanding its extensive use) is still in good condition for work.

Our society in its travels over the state has held (including the present one) forty-one conventions in fourteen different places. It is scattered over a territory nearly as large as all the rest of New England, with less than seven hundred thousand inhabitants and two hundred and fifty dentists in the state, while the other five states have over three million inhabitants and eighteen hundred and seventy-three dentists within an area but little larger than Maine. With this disadvantage we can hardly expect as much progress as those so much more favorably situated. Our changes are the same as in all societies. The older members gradually subside and finally disappear; their places are taken by younger members, naturally more energetic and progressive, and this ever-recurring change will leave the future welfare of our society largely dependent on the character and attainments, as well as numbers, of its new members.

As it is our tendency to recall the past, I notice briefly a few of the changes that have taken place during my half-century of practice.

Our younger members, coming into practice from our dental schools and colleges, with their social relations still lingering as a pleasant memory, will hardly be able to realize the state of feeling existing among dentists before the day of dental schools, when, with a few exceptions, a rather formal bow was nearly the limit of professional or social intercourse. The general rule at that time was for everyone to keep whatever he knew, or thought he knew more than others, carefully to himself for his own exclusive use, seeming to think that imparting any of his knowledge and skill to others in the same profession would diminish his supposed superiority, and tend to bring him to the common level. That this method shut out much more than it shut in, a more generous intercourse has made sufficiently apparent.

The isolated way in which dentists labored little more than half a century ago, receiving no aid from other members of the profession or benefit from their experience, is a contrast to the free exchange of opinions and ways now so common, when able and carefully-prepared papers on almost every subject connected with our work are read at our conventions and followed by interesting discussions, and both published in our widely-circulated journals for the benefit of all who care enough for their own progress to read them. The valuable time of busy men is spent in studying the mysteries of disease, and the result of their patient labors is brought by our journals within the reach of all who care to learn. It seems as true of knowledge as of other possessions, that the more one has, the more he desires; but, unlike other possessions, those most largely furnished with knowledge are not only willing but glad to share it with the less fortunate.

The first work on dentistry published in this country was issued in 1801. The continued publication of books up to the present time furnishes students with lists of all the known remedies for the various diseases to which teeth are subject.

My first lessons as a dental student were learning to shape and temper the cutting and filling instruments I expected to use. These were generally points made from steel wire, which were inserted into sockets in ivory, pearl, or ebony handles that could then be purchased. Almost the only instruments ready for use were those for extracting, a good set of which had been for some time in general use, and they have been continually improved up to the present time. The dental depots now contain everything in the way of dental instruments that can possibly be used, in such numbers and variety that making a selection is no easy task for the young dentist when procuring his outfit.

Teeth made of ivory were in use to a very limited extent when I commenced practice, and during the first few years I replaced teeth carved from a block of ivory, with mineral teeth on a gold base, the ivory being always in a state of decay not very unlike that of the natural teeth. Gold and silver were then the only materials used for bases. Platinum came into use with what is called continuous-gum work, which originated in France as early as 1820, but was not patented in this country until 1851. Gold and silver continued as the principal materials until 1852, when the first vulcanite patent was obtained, and this material has now become the principal one, although several other materials are used, which I need not enumerate. The present supply of artificial teeth with all the different forms, sizes, and colors required, single or in sections, with gums attached, is a change from the time when I, as well as many others, made all the teeth used in our practice, from a single one to an entire set, on a gold or silver base, and this was continued until vulcanite took possession and so cheapened artificial work that teeth could be purchased ready made cheaper than they could be made for each case, and from about 1852 only a few continued to use gold for base, or to manufacture teeth instead of purchasing those ready made.

For several years beeswax was the only material I knew of for taking impressions, until plaster was introduced in 1844, and this material soon came to be preferred to all others. Gutta-percha followed some three or four years later, and modeling wax is a still later and I think the latest material for taking impressions.

Gold and tin were the only materials I knew of for many years for filling teeth, except amalgam, the use of which had then become a vexed question, but was cautiously resorted to in cases where gold or tin could not be employed. Gold was then only employed as soft or non-cohesive gold foil till 1855, when adhesive gold foil (as it was then called) was first made public. The various kinds of cohesive gold now in use, including sponge, or crystal gold, have been the result of many changes in the way of progress.

Tin was used as a substitute for gold when economy was to be considered or when frail teeth were to be filled, and answered a very good purpose in arresting decay, but wore away like gutta-percha when exposed to attrition from use, and its dark color was an objection when in sight. Amalgam has not only taken the place of tin, but to a large extent is used instead of gold, and from the time the American Society expelled its members for using it, to its present perhaps too free use, it has gone on its mission saving teeth with more or less success, according to the intelligence and skill of those using it. Gutta-percha, oxychloride, and the oxyphosphates have all been added since 1848. The rubber-dam, so indispensable at the present time, was not in use or generally known till 1864, and the burring-engine not till 1870. I had been in practice more than thirty years without an engine. If my young friends beginning their work with one should ask me how I managed without it, I could only answer that I have so entirely forgotten how it was done, that I hardly think I could do it again.

My practice commenced just before we had a dental journal, dental college, or dental society, if we except the three societies that only had a beginning. The comparatively few isolated members in practice at that time, with no benefit from each other's experience, and making but moderate progress, have now become a large and useful profession, with some fifteen thousand members, twenty dental journals, thirty-three dental schools and colleges, and probably more than one hundred dental societies. With the aid of these educational and social advantages, it may be well for us to remember that our responsibilities are correspondingly increased.

PROCEEDINGS OF DENTAL SOCIETIES.

JOINT UNION MEETING OF THE NEW JERSEY AND PENNSYLVANIA STATE DENTAL SOCIETIES.

THE convention was called to order at Asbury Park, N. J., July 15, 1891, with Presidents L. Ashley Faught, D.D.S., of Philadelphia, and George Emery Adams, D.D.S., of South Orange, N. J., as presiding officers.

Dr. Faught read his annual address, in which, after referring to the losses which the dental profession had recently sustained in the deaths of Drs. W. H. Atkinson, James W. White, W. W. Fouché, Ambler Tees, and Stephen R. Wing, he called attention to the large accessions recently made to the dental ranks, the colleges in Pennsylvania alone furnishing two hundred and fifty graduates from the last session. It was his belief that "the number admitted to practice this year and year after year was out of all proportion to the possibility of thorough education." "The attempt on the part of the student to obtain the right to practice at the smallest outlay of money, time, and labor, and the rivalry upon the part of our institutions to claim superiority and to rank as the best, based upon the false standard of being the college graduating the largest number," he believed to be "a fault which must be remedied before much progress in reform can be made. Partially-educated men only can be the result of such struggles." He called attention to the lax observance of the principle of professional brotherhood, as defined by the code of ethics, and with a view to promoting the fuller appreciation and maintenance of right professional relations, [said that "it seemed fitting and opportune, in view of the present status of the subject, to have in the very near future the dental code of ethics remodeled and made more full and specific upon many points, so that they shall remain at all times prominently in the minds of all members of the profession, that the benefits of their restraining and constraining influences may ever be operative." As bearing upon the dignity and welfare of the dental profession in its relation to the general public, he said, "We are too willing to-day to rest in the possession of a title which was won only by the spirited aggression of our professional predecessors, and to stifle our consciences with the vain and childish flattery that this title in itself fools and dazzles the public into a belief in our respectability as members of a learned profession, or perhaps we believe such independent position conceded to us because by legislative action we have forced the matter upon the public in nearly all states of the Union. It is, however, clear to every observing mind that our independence, about which we have heard so much during the last year, is far from being an established fact." "Dental independence is to be secured not only by protective legislation, by enforcement of dental law, by a specific code of ethics, but also by public education. When the public is taught those things about dentistry of which they are now grossly ignorant, the great public interest will be represented in the demand for protection and the independent professional aspect will become an established fact. This public education requires the personal consecration of each individual member of the profession. To teach, he must comprehend clearly his own position. There is an illusory and unattainable independence which is a mere dream, a fiction, but there is also a reasonable and attainable independence not inconsistent with our obligations to our kindred professions."

The annual address of George E. Adams, D.D.S., of South Orange, N. J., president of the New Jersey Society, was next read, in which he called attention to the part which the dentists of his state had taken in inaugurating the movement toward holding an international dental meeting at the time of the World's Fair in Chicago in 1893; also the movement started by the New Jersey State Society for the abolition of all patents upon operations upon and in the mouth, and stated that twenty-two societies throughout the country had already joined with them in the movement.

Professor Charles Mayr, of Springfield, Mass., presented a paper on "Anti-Antiseptics," of which the following is an abstract:

His argument, he stated, as implied by the title of his paper, would be directed against the principle underlying the constant use of antiseptics, at least to the extensive degree practiced by many.

His principal objection was based upon the fact that "we do not know at all which microbes are useful to the body. We know a few which are harmful to a limited extent, but the useful ones have not yet been determined, and there is hardly any doubt, judging from analogies, that many thousands of kinds exist." Among other examples he stated that "it has been observed that a tree belonging to the variety *quercus* (oak) cannot live without a microbe parasite at its root, which assimilates salts for the purposes of the tree. In the human system the pancreas is a perfect breeder of microbes, the pancreatic juice is loaded with microbes without which food would not be properly digested in the stomach. The process of digestion is almost the process of putrefaction ; digested food contains the products of putrefaction, even the offensive odor showing the unmistakable action of microbes." We must not lose sight of the fact that the whole process of living is the resultant of a continuous struggle, the destructive action of certain outside microbes and the conservative inside action of the microbes inhabiting the body. The red and white blood-corpuscles are microbes. In malaria the microbe of malaria imbeds itself in the red blood-corpuscles, and thus evades the destructive attack of the white corpuscles.

In this struggle for superiority we have always to reckon with these two forces. The body or a certain tissue may succumb from a twofold combination : excessive outside attack of microbes with normal strength ; this is exemplified in cases where people have survived say an ordinary attack of cholera, but have succumbed during a violent epidemic ; or the attack may be moderate but the defense of the tissues weak. In that case even an infection perfectly harmless to a normal body will prove fatal, as is well shown by the various kinds of chancres. In ordinary strong constitutions it is one of the mildest, and in fact an entirely harmless venereal affection ; but let the same small sore be started in persons with broken-down constitutions, and the destructive forms of phagedenic and of gangrenous chancre occur. Most people at one time or another in their lives are severely exposed and infected by the bacillus of tuberculosis, and, as post-mortems have shown, in more than one-half the corpses the remnants of such infections can be found, but strong constitutions overcome the enemy.

By the use of antiseptics we are apt to destroy the equilibrium between attacking and resistant forces. An antiseptic for the time being will destroy the enemy ; it also weakens the destroying cells, and if, therefore, another attack should come, and our cells do not receive the outside auxiliary of the antiseptic, they are apt to be weaker in the struggle than they would have been without the antiseptic ; thus the use of antiseptics necessitates their continuous application.

The use of antiseptics should be limited to those cases where there is evidently a superior strength of the attacking microbic enemy, but their use should be discontinued as soon as tissues are strong enough to take care of the attacks themselves. Thus occasionally in the mouth a pyogenic condition has taken such a firm hold, and the tissues are so weak, that outside help is imperatively demanded, or decay of a tooth maintained by supplies from without is much stronger than the weak defenses of the tooth, and then is needed the outside help of barriers of gold or amalgam against further attacks.

But quite different from such truly surgical and justifiable uses is the constant drenching of tissues with antiseptics, which is no more justifiable than it would be to leave an excavator sticking in a tooth all the time to be ready the next time decay occurs; for a similar reason we should not deluge the mouth continually with chemical excavators—antiseptics—when there is no need for them. We are threatened in this age with a new phobia, microbiphobia. The people have heard of microbes, and they suspect everywhere a fatal infection. They would rather disinfect their food than cook it.

Our tissues in the long run will, if unhampered by drugs, take care of invading microbes without the aid of outside skilled interference.

For surgical uses antiseptics are invaluable. For hygienic purposes they are out of place. Nothing is indifferent in the plan of the world; everything is a blessing in the right place, and a curse in the wrong.

Discussion.

Dr. Joseph Head, Philadelphia. The future advance of dentistry must be along the line of antisepsis, or else the advance will cease. The theory of Dr. Mayr is ingenious, but unfortunately the proof is based upon analogies which at best are misleading.

No one denies that a microbe may be useful in its proper place, but if the bacilli of manure or of the small intestines find their way into the mouth they at once become the sources of incalculable evil. Because certain microbes aid digestion, because certain germs assist the growth of an oak, is there any proof that bacilli exist in the mouth which are able to destroy putrefactive spores? The presence of useful germs can only be proved by a microscopic demonstration which is yet to be presented to the profession. Dr. Mayr further says "that the harmful microbes in the body carry as many elements of good as of bad." What good may we find in the microbes of smallpox, scarlet fever, measles, pyorrhea alveolaris, or trichinosis? If it is true, as Dr. Mayr says, that "the tissues are not bettered by drugs and outside interference," let us disband at once. Cleanliness must be our first consideration. Where this is impossible, as in pyorrhea alveolaris, antisepsis is imperative. Even when a tooth has been thoroughly excavated I can see no harm in soaking the walls with bichloride or carbolic acid. The thin layer left in the cavity dried by hot air can do no harm, and must give greater security and permanence to the filling.

In cases of pyorrhea alveolaris, or in any condition where chronic sepsis of the oral cavity exists, a mild antiseptic gargle may do great good. Personally I have never noticed any weakening of the mucous membrane from such washing.

In the presence of an acid saliva, lime-water should be extensively used. Healthy tissue needs no assistance, but in skillful hands antiseptics are invaluable servants.

In closing, I will quote briefly from the beginning of Dr. Mayr's paper. He says, "My principal objection to antisepsis lies in the fact that we do not know which microbes of the body are useful. Many are harmful to a limited degree, but even the bad have as many elements of good as of evil." Thus he says that the bad effects of decay are counterbalanced by its good effects. That we must not destroy the noxious microbe lest the good perish. Thus does he not only war against antisepsis, but cleanliness. For if the microbe elements in the mouth do as much good as harm, do we not commit an indiscretion when we use a toothpick or brush? The logical deduction to be drawn from our friend's statement is that we should refrain from injuring the good microbe even if the noxious germ be allowed to go unharmed, and in this I cannot agree with him.

If a delicate pair of tweezers could be invented that would pick out the bad and leave the good microbe to pursue his virtuous occupation unimpeded, it might be otherwise. I am a firm advocate of asepsis, but when that is not possible let us have antisepsis.

Dr. George W. Weld, New York. I trust that neither Professor Mayr nor his friends will consider that I belong to that class of people who would "rather disinfect their food than cook it." I am inclined to think that the professor believes only half of what he says, at least a half of what the title of his paper would imply, for he commences his essay against antiseptics, and ends it with a statement that "for surgical uses antiseptics are invaluable," but "for hygienic purposes they are out of place." Gentlemen, whether in the domains of surgery or in the realms of hygiene, a *septic* is a substance that promotes putrefaction. *Anti* is a preposition signifying *against*, *opposite*, *contrary*, or *in the place of*, used in composition in many English words. Therefore, when we refer to the word *antiseptic* (anti and septic), we mean a remedial agent that is opposed to or counteracts putrefaction or a putrescent tendency in the system. *Anti-antiseptics* means something *against antiseptics*. This newly-coined word would seem to imply, from a pathological standpoint, something that *favors* a putrescent condition.

The use of antiseptics usually follows in the train of special pathological conditions; and they are not *constantly* used, as the writer of the essay would have us believe. The distinction between a useful and a harmful microbe has its parallel in the distinction that is made between physiology and pathology.

An antiseptic, then, in connection with a microbe or a bacillus, signifies a pathological condition of affairs, and is simply a remedy,—something, as its name implies, which reaches out to alleviate or counteract unnatural and morbid conditions. The good and harmless microbes, which the professor alludes to, must be considered from purely a physiological standpoint; and an antiseptic which opposes and destroys the malignant and destructive microbes in no wise, so far as I can judge, interferes with the life of his brother, whose friendly object, apparently, is to maintain and prolong, rather than shorten, the life of any one of the various organs of the human body.

In connection with this part of the subject let me quote a few of the professor's words : "We have not to lose sight of the fact that the whole process of living is the resultant of a continuous struggle,—the destructive action of certain outside microbes and the conservative defensive action of the microbes inhabiting the body," a statement which I wish to observe right here, in parenthesis, has never been demonstrated. "In the struggle for superiority we have always to reckon with these two forces. The body or a certain tissue may succumb from a twofold combination : excessive outside attacks of microbes with normal strength ; this is exemplified in cases where people have survived say an ordinary attack of cholera, but have succumbed during a violent epidemic ; or the attack may be moderate but the defense of the tissues weak. In that case even an infection perfectly harmless to a normal body will prove fatal, as is well shown by the various kinds of chancres. In ordinary strong constitutions it is one of the mildest, and in fact an entirely harmless venereal affection ; but let the small sore be started in persons with broken-down constitutions, and the destructive forms of phagedenic and of gangrenous chancre occur."

In one respect it may be said that the professor is right in stating that in all acute diseases occurring in persons with broken-down constitutions,—and for that matter, it may be observed, in those persons already affected with some important disease,—the prognosis and chances of recovery are not so favorable as when healthy subjects are attacked. At the same time, if we eliminate the complications, whatever the complications may be, that add to a probable fatal termination, it may be said that neither the constitution nor the physical strength of the patient lessens the intensity of the disease or gives hopes of any certain recovery.

For instance, it is well known that where a strong and healthy person is attacked with some acute and malignant disease, the vital powers of life become so suddenly depressed that death results from exhaustion. On the other hand, it has been observed time and time again that an apparently anæmic person, but possessing a certain essential nerve-force, will withstand the sudden onslaught of the disease, and recover, when, under similar conditions, the once strong and healthy die.

It is on this account that the intelligent physician at the bedside oftentimes anxiously waits for the *crisis*, and frequently avails himself of any antiseptics or any stimulants that may suggest themselves to his mind, knowing that if he can bridge his patient over, so to speak, even for a period of a few hours, the crisis will have passed, and a favorable prognosis and a sure recovery will follow.

But more particularly is this point emphasized when the professor speaks of chancres as being " one of the mildest, and in fact an entirely harmless venereal affection." In conversation with a distinguished physician* of New York who makes venereal diseases a specialty, I have learned, and am confident in saying, that if the essayist refers to the initial syphilitic sore, I must most respectfully beg leave to differ with him as to the cause of the mildness of the effects of the virus upon the constitution. He assumes that this is due to the fact that the resisting normal microbe overcomes the onslaught of the active elements of the syphilitic virus, whereas facts conclusively prove that whatever mildness syphilis possesses among civilized people is due to the slow process of syphilization, extending over a period of certainly four hundred years in Europe, and perhaps five thousand years in China, according to documents found in the Chinese archives. The body to-day receives not necessarily an attenuated virus, but is in a condition to receive the syphilitic virus without being malignantly overwhelmed, this condition being due to having been for centuries under its influence (modified materially from the healthy man of the thirteenth century in Europe), and the tissues impressed continually with the poison, which, until comparatively recent years, has been allowed to run its course unchecked by treatment ; and here I venture to remark that the highest type of antiseptic treatment—antiseptic treatment the result of which continued for years under proper scientific appreciation of the effect of mercury—antagonizes the virus and restores the tissues to a point very nearly, if not wholly, approximating the healthy condition of the civilized man of the present age.

In proof of this claim, we have had in recent years evidence of the effect of syphilitic virus upon a healthy and strong constitution, viz : that of the inhabitants of the Sandwich Islands, where the virus which affects civilized man so mildly developed all its malignant and destructive features, and has decimated its population and dwarfed the growth of that once magnificent type of man.

There remain in connection with the professor's paper one or two statements regarding which I should be very glad if he would furnish some information and proof.

1. By what authority does he state that the pancreas is a perfect breeder of microbes ?

2. By what authority does he state that food cannot be properly digested in the stomach without the aid of the pancreatic juice loaded

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*W. R. Chichester, M.D., New York.

with microbes? So far as I have been able to learn, the *pancreatic juice never enters the stomach*, but is discharged through its duct into the duodenum.

3. By what authority does he state that the process of digestion is almost the process of putrefaction? In this connection I quote from Dalton's Physiology.* In speaking of the gastric juice he says, "A further peculiarity of the gastric juice is its *resistance to putrefaction.* While other animal fluids, as the saliva, bile, pancreatic juice, mucus, and blood, enter into putrefaction with great readiness, gastric juice may remain exposed to the air at ordinary temperature for months without developing any putrescent odor or losing its characteristic properties. It becomes somewhat darker in color, and after a time deposits a brownish sediment, but retains its acid reaction and its powers of digesting albuminous matters. It will even arrest putrefactive changes which have already begun in organic substances, and consequently putrefaction *does not go on in the living stomach.*"

Beaumont preserved fragments of meat unaltered for a month in gastric juice, while other portions kept in saliva were putrefied in ten days. Spallanzani found in the stomach of a viper the body of a lizard which had remained for sixteen days without putrefactive alteration, and similar observations have been made by other physiologists. According to Richet, the antiseptic property of gastric juice depends entirely on its free acid, and not in any degree on its organic ferment.

On another page † the same authority states that "the nature of the change caused by digestion in the alimentary substances is partly physical and partly chemical. But although this change is indispensable for the absorption of these substances in due quantity, it does not consist in any profound alteration of their chemical characters. The alimentary materials are not decomposed nor converted into substances of a different kind. They are simply transformed into soluble materials of the same class with themselves. The carbohydrates after digestion remain carbohydrates, the albuminoid matters are still albuminoids, and the fatty substances retain the chemical properties of the fats. The transformation of starch into glucose by the digestive process is an act of hydration, which may be accomplished by continued boiling with water and a mineral acid outside the body. Albuminous matters, in digestion, are converted into peptones. This change is also regarded as a hydration, and it has further been shown that albumen may be made to undergo a similar transformation by long boiling in acidulated water, or by boiling at a high temperature under pressure. Thus the animal ferments, in the alimentary canal, act by inducing rapidly, at the temperature of the body, changes which would otherwise require a longer time or more powerful agencies. Lastly, the fatty substances are reduced to a state of emulsion, and in this condition diffused through the digestive fluids. This effect, which is mainly due to the contact of an albuminous liquid, may be aided by a partial acidification and saponification ; but the principal mass of the fat, in undergoing the digestive process, only assumes the form of a chylous emulsion.'' All the alimentary substances are accordingly made ready for absorption without losing the essential features of their chemical constitution.

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* "A Treatise of Human Physiology," John C. Dalton, 1882, p. 157.

† Ibid., p. 139.

4. I would like to ask the professor by what authority he compares and relegates the red blood-corpuscles of the human body to the level of microbes ? If I understand their function, it is to serve mainly as carriers of oxygen. The readiness with which they absorb this element from the atmosphere, and their changes of color depending upon its supply or withdrawal, indicate that they have a special relation to its introduction and distribution in the body. As a rule, in animals where the red blood-corpuscles are of large size and few in number the activity of the vital functions is below the average, while in the species where they are smaller and more numerous the processes of respiration, circulation, nutrition, and movement are increased in rapidity to a similar degree. The strongly-marked physical and chemical characters of the red blood-corpuscles correspond with their importance in the functions of vitality.

5. By what line of reasoning does the professor conclude that for ''surgical purposes antiseptics are invaluable,'' but for ''hygienic purposes out of place''?

Where are the various forms of epidemics which, at intervals, in former years, covered the lands with desolation and death ? Of what avail, may I ask, are the rigid sanitary precautions exercised by every board of health in every seaport town, reaching from the coast of Maine to the Gulf of Mexico, if our modern scientific knowledge of hygiene and antiseptics is only a myth ? If we assume the cause of epidemics to be germs, then the evolution and development of organisms therefrom require certain conditions.

With our present knowledge the mode in which the susceptibility to these causes is destroyed may not be fully explained, but we do know that the seed must have its appropriate soil, and that various circumstances may, on the one hand, promote and on the other hand arrest its germination.

We know that in some inconceivable mode contagious and infectious diseases effect a permanent destruction of the unknown conditions within the body, on which depend the development and multiplication of germs which, it is assumed, constitute the causes of these diseases; and experience has taught us that the application of our present scientific knowledge pertaining to hygiene and antiseptics serves to arrest, if not entirely prevent, the epidemics and scourges of former years.

(To be continued.)

*Discussion on Nitrous Oxide.**

Dr. J. A. Osmun, Newark, N. J. The paper just read is one of the most instructive and comprehensive to which it has been my good fortune to have listened, and we are to be congratulated that we have had this subject so cleverly presented to us. The subject and its manner of presentation brings us face to face with the most important operation within the domain of dentistry, and shows most conclusively that it is no child's play to properly comprehend all the dangers that lurk around this apparently easy operation.

The doctor has gone into the practical issues and methods of procedure so thoroughly from a clinical point of view that there is little to add, except in the way of commendation and emphasis. However, there are other questions of importance involved, and it may be profitable to look at this subject from another standpoint in order that the fullest light may be thrown upon it.

Some of the experiences quoted are to a greater or less extent familiar to each one of us who has had any extended experience in the use of this agent. I do not wonder, therefore, that the speaker expresses surprise that so few fatal cases have resulted from its indiscriminate administration. The statement so often made, and by dentists as well as by those not familiar with its manifestations, that nitrous oxide is a perfectly safe anesthetic, should be modified to some extent, as I doubt not nearly all present will indorse. Once let the idea prevail that nitrous oxide is a *perfectly safe* anesthetic, and there will be less precaution taken than there is now, and Heaven knows that there is enough carelessness in its use at the present time.

The point is well presented, that any agent capable of producing unconsciousness and insensibility in a strong man within so short a period calls for caution, judgment, and a knowledge of no mean order; and when we take in the full significance of the condition of complete anesthesia, of the grave and frightful condition in which the patient is placed, with more than half of his vitality suspended, and the boundary line between life and death narrowed to such a near approach, coupled with the startling fact that in the hands and to the knowledge, the fidelity, and the skill of the administrator rests to a very great extent the issues, it is difficult to overestimate the great importance of this subject.

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* Dr. Thomas's paper will be found on page 956. The discussion upon it is inserted here out of its regular order in time that it might appear in connection with the paper,—a course justified by the importance of the topic and its manner of presentation.—Ed. Dental Cosmos.

The fact so ably presented, and supported by the figures, to the effect that nitrous oxide is the safest anesthetic now known to us, is undoubtedly true ; yet there have been some deaths recorded that cannot be explained away on any other basis than that they were caused by the inhalation of nitrous oxide. Then, again, many serious charges have been brought against it by persons who have inhaled it for the purpose of having teeth extracted, and who date from such a time a condition of ill health. This does not imply that it was improperly administered, nor can it be charged to a mere coincidence. There must be some foundation for the statement so often repeated.

We recognize the fact that there is a wonderful difference in the susceptibilities of different persons, as well as a difference in their recuperative powers, and also the fact that the same person will exhibit at different periods of life various degrees of vitality. All this needs to be impressed upon our minds frequently, and to be remembered when diagnosing a case for the use of this agent.

The essayist has directed our attention to the importance of being thoroughly equipped with inhaling apparatus of simple construction, gas of known purity, etc., and all other necessary adjuncts at hand, and then adds, "With a patient of good health, normal circulatory and respiratory organs, one can expect happy results." But unfortunately all are not of this order, as is so ably shown by the writer. This fact suggests the thought, How much of a preliminary examination must be made to ascertain these facts?

The essayist has touched to a limited extent upon the supposed verdict in a case of death in some of the cases submitted for your consideration. This opens up a wide field for investigation and thought, and it cannot be well ignored by anyone who assumes the responsibility of administering an anesthetic.

I do not believe that as yet in the eyes of the law dentistry has been recognized as a specialty of medicine. If I am right in this position, then when a dentist assumes the responsibility of administering an anesthetic he must use all the precautions that would be expected to have been used by the medical man,—first, in diagnosis ; second, care of the patient while under the influence of the anesthetic ; third, the means used for resuscitations in case of unfavorable results ensuing ; and at this point each would stand upon equal footing and be amenable to the same law. I leave with you this thought as to the necessity for the precautions I have indicated.

I will cite, with your permission, a part of a charge lately made to a jury in New York in reference to this subject: "As an anesthetic deprives a patient of the control of his faculties and renders him unable to take any precautions or make any effort for his own safety, the physician or surgeon administering it must exercise the highest professional skill and diligence to avoid every possible danger. The professional man, no matter how skillful, who leaves an essential link wanting or danger unguarded in such treatment, is chargeable with negligence and answerable for any resulting ill consequences."

This charge places us in a position that cannot be very well evaded, and points out very clearly to our mind that we are expected to know something of the previous physical history of our patient before administering this agent; and while I do not ignore the fact that the experience of the operator can see and take into account many things at a glance that will enable him to arrive at a very accurate diagnosis, I also do not forget the fact that there is an adage which reads something like this: "Familiarity breeds contempt," and the importance of the previous examination of the colleges should make this a feature of great importance.

However, the question of unskillful treatment of a patient is one not easily determined; but it seems to be a settled principle in law, that a reasonable degree of skill must be shown, and everyone who enters into a profession undertakes, in so doing, to bring to the exercise of it such knowledge. Enough along this line.

After listening to the various cases cited, of which we are all to a greater or less degree familiar, and which we can substantiate from our own experience, we can only regret that so little is known positively of its real action upon the human economy. The therapeutic value of this agent has only been recently recognized, but in many instances physicians who have made the acquaintance of this gas have found it of value in many disorders, notably those of nervous and respiratory diseases. I have administered it with the happiest results to patients who were suffering from asthma. For insomnia it has been recommended by high medical authority, and it has been also highly urged as a therapeutic agent of great value in hysteria and melancholia.

The doctor has given us the details of the various means and methods he uses in cases of resuscitations, and there is but little to add. However, he did not mention the use of the hypodermic syringe, and the insertion under the skin of equal parts of brandy and ammonia; this is always my sheet-anchor of hope. I never administer the gas without looking at my hypodermic syringe to see if it is in good working order; it acts like magic, stimulating the heart's action and the respiration. I should like to commend this practice to you.

The paper is so full of good things, that it is only possible to touch upon a point here and there.

The experiences related, the suggestions offered, all tend to emphasize the fact that in the administration of nitrous oxide we assume a serious responsibility, and in order to measure up to the requirements we must study the question carefully, diagnose critically, exercise great care during the period of insensibility, be fertile in resources at dangerous places, and always have the third person present. I will not trespass longer upon your time; I realize how inadequate these thoughts are compared to the importance of the paper.

I can only add my personal thanks for all the many valuable suggestions I have gotten from our Philadelphia friend.

Professor S. H. Guilford, D.D.S., Philadelphia. I think I am only paying a deserved compliment to our friend Dr. Thomas when I say this is the best paper on nitrous oxide I have ever listened to or read.

The use of nitrous oxide gas has taken a firm hold upon the affections of the dental profession. It has done so because of its many advantages. There are some things connected with it that, I think, will bear repeating and keeping in mind.

First of all, in regard to its discovery and introduction. About the time that our forefathers were striking for their liberty, and in the very year, and possibly about the very time that they were framing the Declaration of Independence, nitrous oxide gas was first discovered in his New England laboratory by Dr. Joseph Priestley, in 1776. About the beginning of our present century, Sir Humphry Davy first suggested the possibility of its possessing anesthetic properties. About fifty years ago, Dr. Horace Wells, of Kentucky, was the first to practically demonstrate that it did possess anesthetic properties; and though Dr. Priestley was not an American, he was an adopted citizen of America, and remained here until his death. Sir Humphry Davy was an Englishman, but Dr. Wells was American born; so that of the important facts connected with the early history of nitrous oxide, we, as Americans, can lay claim to the first discovery of the gas and the first practical application of it.

Another point to be considered is its relation to the ordinary atmospheric air. Both these substances, nitrous oxide gas and atmospheric air, are composed of nitrogen and oxygen, atmospheric air consisting of four parts nitrogen and one part oxygen, and nitrous oxide gas of one part nitrogen and two parts oxygen. In air we have nitrogen and oxygen simply mixed, with no chemical union whatever; whereas in nitrous oxide gas we have an absolute chemical combination, and we cannot, under ordinary circumstances, separate the two. So that while we breathe the air which contains a certain proportion of oxygen, that oxygen is taken up by the blood in the lungs and carried through the system and does its proper work. When we breathe into our lungs nitrous oxide gas, it is carried into the system as nitrous oxide gas, and is eliminated as such. The two elements are not separated at all. In early days it was noticed when gas was given from an ordinary gas-bag and inhaler, that when the inhalation was continued for a little while the eyelids and lips of the patient became peculiarly purple and the face assumed a singular color. That of course indicated a certain amount of danger. And it showed that the cells in the lungs were being filled with a substance that prevented the admission of oxygen. It was reasoned that it must produce its effect in one of two ways,—that it was filling the lungs to the exclusion of atmospheric oxygen, or else producing an effect upon the brain. It was supposed that as nitrous oxide gas contained an excess of oxygen over atmospheric air, it stimulated the brain ; but when it was found out that it passed off as nitrous oxide, not losing any of its oxygen, that idea had to be abandoned.

Nitrous oxide acts as a powerful stimulant, and when the system is exhilarated beyond the feeling of pain it naturally produces an effect somewhat similar to hysterics.

In early days the gas was made by the dentist himself. There was great ignorance upon the subject, and there were many cases that were serious in their aspects. And it is not to be wondered at under the circumstances that a certain number of cases should be found where death occurred. The only wonder is that death did not occur oftener. Only a certain change in the amount of heat required will form another gas which is poisonous and deadly. No doubt that gas was often formed mixed with the nitrous oxide. But as we came to better understand how to make it, the unpleasant results grew regularly less, and to-day, where the gas is manufactured pure and in large quantities under careful supervision, and is compressed into bottles that can be carried anywhere, there has not been a record of a single death that I have anywhere been able to find since we have had it in its liquefied form, showing very plainly, I think, that where the gas is properly made, and where it is pure, there is scarcely any danger. When you consider that the gas was made by the dentist himself, that it was administered almost indiscriminately without regard to the patient's condition, can you help wondering that more serious results did not follow?

Now that it has been used so often, and under so many circumstances with comparative safety, I think dentists are likely to become careless. They have secured such immunity from serious results that they may feel that the administering of gas is a perfectly safe thing. But as the essayist said, there is no absolute safety. Any change from ordinary conditions in life is dangerous. We cannot take a patient and change his condition of life, bringing him to a state of unconsciousness, to that narrow line that separates life from death, without running considerable risk. And it is for this reason that persons who give the gas, even though they perfectly know how, and it is perfectly pure, should never undertake to administer it without having at hand those remedies which will counteract serious effects. And in addition we should understand how to make use of the different methods of artificial respiration, because many patients would have died but for the application of this knowledge.

Another thing the essayist did not speak of. That is the mixing of nitrous oxide gas with other anesthetic agents. In this country dentists found that in a great many cases its effects did not last long enough to fully satisfy them. Under those circumstances, and not feeling that they wanted to risk the use of ether or chloroform, they cast about for some method by which they could prolong the anesthetic state after having administered the gas, and it led to the combination of the gas with some of the more lasting anesthetic agents. The difficulty is, what means should we resort to to counteract the possible ill effects of such a combination? Shall we apply the remedies of nitrous oxide, or of ether, or of chloroform, etc.?

In this way, I think, we would be liable in case accident occurred to be brought into court, and when questioned, if obliged to confess that we used a preparation like Vail's vapor, for example, and did not know what it was composed of, our confession that we used a combination of anesthetics would be apt to cause the case go against us. Combined anesthetics have been given successfully in this country, and I notice by the English journals that they are being used in England. At the same time I agree with the essayist that nitrous oxide gas, pure and simple, answers all the purposes of the dentist so far as the extraction of teeth is concerned.

Dr. C. Huestis, Dakota. I would like to ask Dr. Guilford one question. If I understood him, he said that the gas was eliminated from the lungs having the same chemical properties that it possessed when it was inhaled. If that is so, what becomes of the carbonic acid gas in the mean time?

Dr. Guilford. We know that it is present and doing its work, from the change of color in the face. That color passes off, so that which caused it has passed away as the carbonic acid gas.

Dr. W. A. Conrad, St. Louis. The paper upon nitrous oxide gas was a strictly scientific paper, and one of more than ordinary interest. Judging from the fact that the subject has been presented to you in such an eloquent manner, and from the fact that none of the gentlemen wish to take part in the discussion, I should say that these are two societies of gas-givers. They must certainly indorse gas-giving, and for one I would like to place myself upon record as being opposed to the use of it. In the first place, Mr. President, the use of nitrous oxide is, without question, dangerous. None of the gentlemen who have presented the subject have said the contrary. It is the most desirable of all anesthetics for dentists, but they all say it is dangerous, and for that reason I am opposed to it.

But I am opposed to it for other reasons. It places in the hands of a certain class of men an opportunity of attracting business, and doing a great deal of harm to the public, and for that reason we, as dentists, should oppose it. We have also dangers in the administration of nitrous oxide gas other than that of death. For a number of years I administered nitrous oxide gas to the general public and also for the benefit of dentists, and I am ashamed of it, for during these five, six, or seven years of my life thousands of teeth were lost that should never have been lost. The essayist says in his remarks that it has been administered thousands of times,—seven hundred and fifty thousand times; only seven hundred and fifty thousand people, but how many teeth does that represent? He goes on and says you can extract from one to fifteen or eighteen teeth at one administration. What does that mean? Does any dentist who practices what we call operative dentistry ever find it necessary to extract that many teeth from one mouth at one time? I am sorry to see the subject assume these proportions. I am sorry to see the New Jersey State Dental Society sit here and say nothing on such a subject as this. I am from the far West, and we do not believe in extracting teeth there. Indeed, when it is necessary to take out teeth, where you have the perfect confidence of the patient, they can be extracted with safety without an anesthetic. There is no danger from nervous shock. There is more danger from nervous shock when an anesthetic of any kind is given. Also, as the result of an experience of five, six, or seven years, I have in mind quite a number of cases in which I firmly believe, as an honest man, that the nervous system of those patients was permanently impaired by the administration of the nitrous oxide.

I am sorry to see that two great societies, having in their membership gentlemen who are intelligent, successful practitioners of dentistry, would allow a paper of this kind to pass without protest.

Dr. Thomas. It gives me great pleasure to hear from the far West in the manner of the gentleman who has just spoken. Possibly they do not have as many teeth to extract there as we do in the East,—probably the population is not so great as it is here. It is, however, pleasant to hear now that there are no teeth which need to be extracted, that they save every tooth. If you take into consideration that in this section of the country there are but about twelve per cent. of the people who go to dentists at all, what are you going to do with the remainder that suffer toothache? It is all folly for a man to assume such a position in the present day. I shall be just as glad as any gentleman here when there shall be no teeth to extract. In my practice I do take out teeth that ought to be saved. I won't do it if the patient will have them saved. According to the gentleman's own statement, he has done something of which he is ashamed; but I am not. I relieve the suffering; so do the clinics of our colleges. Save teeth where you can, but relieve the suffering even by extraction: that is the province of the dentist.

So far as the safety of nitrous oxide gas is concerned, we all acknowledge there is danger in taking this gas; but when you consider the thousands of people who do take it with safety, it is pretty good evidence that the dangers are very slight. As you all know, there are thousands of people who are so nervous that they cannot bear the touching of sensitive dentine, and they can no more bear having a tooth taken out. But by using an anesthetic you eliminate both pain and nervousness so that they can bear the operation as they could not otherwise.

Dr. Conrad. Dr. Thomas spoke the truth; anyone that has been connected with the dental colleges as a student or as a teacher knows it is true that many teeth are unnecessarily extracted in the colleges. The business end of the college must have money, and they won't allow the clinics to be performed free, as they should be, and they have these teeth extracted by the thousands when they never should be extracted.

Dr. Guilford. I want to say one word in reply to Dr. Conrad. His last argument would be very good but for one fact, and that is that the colleges do not charge for extracting teeth.

Another point, Mr. President. We all know very well how much in advance the West is of the East. And we know, too, that when they come and tell us certain things we can look up to them because we know they tell us the truth; they simply tell us of things as they exist in their own country. We feel in the East that we have not advanced as fast as they have in the West. But we are coming to it. We think the day is coming in the East, as it has in the West,—particularly St. Louis, where they never extract teeth,—that we will also scorn to do it; and when that time comes, when we have no longer any use for nitrous oxide gas or the extracting forceps, we will all be happier with the exception of Dr. Thomas, who, instead of coming here with a bouquet in his button-hole, will probably come passing the hat around.

AMERICAN DENTAL ASSOCIATION.

FIRST DAY—*Evening Session.*

(Continued from page 855.)

AFTER the reading of Dr. Talbot's paper* the following discussion ensued :

In reply to a question by Dr. George J. Friedrichs, Dr. Talbot stated that he had made the measurements to see if there was any difference between contracted arches and high vaults of mouth-breathers, and the examination had shown that the vaults are lower on an average in contracted than in normal arches.

Dr. Friedrichs. Has the normal arch been established?

Dr. Talbot thought that forty-six hundred and fourteen cases ought to establish it.

Dr. Friedrichs. To define what constitutes health is a difficult matter. Health is only comparative. A man considered healthy by comparison with another may be very sick. So, in measuring the roof of the mouth, it is a difficult task to say what is normal.

Dr. Frank Abbott, New York, wanted to congratulate Dr. Talbot on the successful outcome of his work. He seems to have established the fact that mouth-breathing does not produce the V-shaped or saddle-shaped arch, which is an interesting and valuable piece of information.

Dr. Thomas Fillebrown, Boston, wished to add an expression of his appreciation of the paper, and to offer a suggestion in corroboration of Dr. Talbot's position. If anyone present will drop his lower jaw down so that the mouth shall be as wide open as that of a mouth-breather, and pass his tongue up by the side of the upper teeth, he will find room enough for it to pass between them and the buccinator muscle, showing that the muscle does not press upon the teeth even at rest with the mouth open.

Dr. W. P. Horton, Cleveland, O., arose to thank the author for the pains bestowed upon the subject. He was not a little astonished at the teaching by the professors of the doctrine which this paper has so conclusively refuted. The reason why mouth-breathing should be confined to the civilized races is hardly comprehensible.

Dr. S. C. G. Watkins, Mont Clair, N. J., understood the paper to state that the contraction of the arch was not caused by mouth-breathing after the teeth had erupted. He would like to ask if it was the cause of any contraction before or during the eruption of the permanent teeth.

Dr. Talbot replied that being a graduate in medicine he had had the opportunity to inquire into the causes of early cases of thumb-sucking and mouth-breathing. He had found babes breathing through their mouths entirely within two or three weeks after birth, yet he had never seen a case of contracted arch with the first set of teeth. They are not found until between the eighth and twelfth years, and the contraction ceases after the teeth are erupted. It all takes place at the time the permanent teeth are erupting.

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* Page 919, current issue DENTAL COSMOS.

Dr. C. N. Peirce, Philadelphia, while congratulating the author upon the labor bestowed on the paper, must dissent somewhat from his conclusions. Mouth-breathing has not been considered the main cause of contracted arches, but one of the factors, and the statement made by the author is an argument in favor of that claim. That deciduous teeth are not contracted by mouth-breathing is due to the fact that the shape of the mouth is established in fœtal life, and the teeth that are being erupted are so short that little mechanical force is brought to bear upon them, and they are not forced out of position or the arch contracted during their short period of development. The period between the eighth and twelfth years, which Dr. Talbot has said is the time when the mouth is contracted, is the period when the bicuspids are gradually coming into position, and the pressure brought upon them by the cheeks does have a tendency during their slow development to force the crowns a little into the mouth, and so produce a narrower arch. The fact that the change never takes place after the twelfth year shows that the change is coincident with the development of these teeth ; so that the speaker claims that mouth-breathing is one of the factors in narrowing the arch. Dr. Talbot says that if this were so, both sides would be influenced alike. Not necessarily, because the pressure may be greater on one side than the other ; at nights the child may lie habitually on one side. There is always a difference in the forces acting on these teeth, so that the result is not necessarily the same on both sides, and it would seem that what the author has stated as evidence that there is not such an influence at work is precisely the evidence that there is,—that the change takes place from the eighth to the twelfth year, and only then, which is precisely the period when the bicuspids are slowly developing.

Dr. W. H. Morgan, Nashville, Tenn., wished to emphasize the fact that departures from the normal shape are confined mostly to the civilized races. They are much more rare among the negroes of the South than among the whites of that region. It is comparatively rare to find a negro with high or deformed arch, or with irregularities of the teeth. He understood the writer to say that the office of the alveolar process was, to some extent, to protect and cover the germs of the teeth. As the speaker understands it, the alveolar processes never make their appearance, especially with the permanent teeth, until the crowns are freed from the bony structure.

Dr. James Truman, Philadelphia, wished to ask Professor Peirce if the bicuspids, at twelve years of age, are liable to be forced in the mouth by the action of the buccinator muscles, why the deciduous teeth are not similarly affected. No change is ever noticed in the deciduous molars. Should they be moved, the tendency would be to drag over the bicuspids which are ordinarily developed, between their roots. The speaker thinks, with Dr. Fillebrown, that it is impossible for the muscles to act upon the teeth to contract the arch, and he is gratified that the theory that mouth-breathing produces these irregularities has been settled for all time.

Dr. Peirce would simply state, in reply to Dr. Truman, that the deciduous molars are very short, and are very quickly erupted compared with the length of time the bicuspids occupy in reaching their permanent places, and therefore there is not nearly the mechanical influence upon the deciduous molars that there is upon the permanent bicuspids. If the argument presented in the paper is correct, an aneurism of the cheek ought to have no influence, yet certainly many gentlemen have seen a slight aneurism force the bicuspids and cuspids entirely onto the palatine surface.

Dr. Abbott. One speaker has said that the alveolar process does not develop until the roots of the tooth begin to grow. That is not the fact. The development of the alveolar process begins at the time of the beginning of the development of the crown, and when the crown of a permanent tooth is fully developed, the alveolar process about it has grown considerably over and above that which has held the temporary tooth in place.

Dr. J. J. R. Patrick, Belleville, Ill. Averages are not scientific facts. If the average measurement of one thousand superior maxillaries be found and one single measurement which differs from that average be added, a new average is formed. He objected to the manner in which these measurements for averages have been made, irrespective of race. Averages answer for speculation. Life insurance companies can deal with the average age of man, but it is not scientific ; it is gambling on the probable longevity of man. An average destroys individuality, and renders classification impossible. Men have tried averages in scientific matters for one hundred and fifty years, and have always abandoned them. One instance will suffice : Dr. Samuel George Morton made a splendid collection of crania, and the measurements which he spent his life and energy in establishing are all thrown aside. Measurements, where they tend to establish boundaries, are valuable because they assist in classification. The celebrated Bertillon introduced a system of measurements of portions of the human body for purposes of identification or reidentification of criminals, based on the fact that there are no two human beings exactly alike, so that an individual once measured can always be identified; and it is applicable in no other sense. The usefulness of the Bertillon system would be destroyed if the fingers of so many men were measured and the average taken.

Dr. Talbot, in closing, replied to Dr. Peirce's remarks that in contracted arches the greatest contraction is at the second bicuspid. If the buccinator muscle influenced the contraction, the first permanent molar must be involved, because the buccinator extends clear to the wisdom-tooth; but the first permanent molar is rarely involved in the contracted arch. Again, if mouth-breathing were the cause, the very point made by Dr. Peirce, that the arch being smaller and the alveolar process in the constructive stage, shows that the temporary teeth would be involved if the buccinator muscle had anything to do with it.

The subject was passed.

(Continued from page 869.)

THIRD DAY—*Morning Session* (Continued).

Section I, Prosthetic Dentistry, Chemistry, and Metallurgy, was called, and Dr. W. B. Ames, secretary of the Section, reported verbally that one paper would be read by Dr. D. R. Stubblefield on Peroxide of Hydrogen, and that Dr. E. Parmly Brown would explain a simple method of banding and crowning roots.

Dr. D. R. Stubblefield, Nashville, Tenn., read his paper, which was entitled "Peroxide of Hydrogen *per se*." An abstract follows:

It would doubtless be recalled that last year Professor Peirce presented a tooth which had been subjected to the action of hydrogen peroxide, and which presented phenomena puzzling to him. First, the H_2O_2 when fresh would apparently attack the tooth, and after a while this excitement would subside. Second, a white, rather flocculent-looking mass which settled to the bottom seemed to increase after each addition of fresh H_2O_2. Third, it was his opinion that the tooth was not eroded and roughened by this seeming attack upon it. In the discussion which followed, the writer, knowing that hydrogen peroxide was made by the action of barium dioxide upon hydrochloric acid, had *guessed* that the active component was an excess of that acid. During the winter he had been able to make a more careful examination. He had procured from New York, Brooklyn, and St. Louis fresh, unbroken packages when possible, but certainly fair samples of the best three makes of hydrogen peroxide. It was easy to detect the presence not only of hydrochloric but also of sulphuric acid in all three. Not satisfied, he submitted samples to Dr. Wm. L. Dudley, professor of chemistry at Vanderbilt University, who found a large percentage of HCl, and by another test a large quantity of H_2SO_4, and in one of the samples a whitish residue which was charred by heating strongly in the platinum cup. These discoveries rise in importance when considered in connection with the statement of each manufacturer that his product is absolutely pure H_2O_2. As to the phenomena observed by Professor Peirce, any one of the three had enough HCl to dissolve the tooth after sufficient exposure, but the calcium chloride so formed, being extremely soluble in water, would not appear as a white mass. On the other hand, any one of them had sufficient H_2SO_4 to dissolve the tooth after sufficient maceration, and the calcium sulphate formed, being insoluble in water, would be precipitated in a white mass. Further still, as the acid grew weaker, the sulphate would coat the tooth and retard or even stop the action. As to the third question raised by Dr. Peirce, the tooth was attacked by acids.

These experiments naturally aroused the question whether dentists ever had used any actual, pure hydrogen peroxide. Has anyone here ever used any but the commercial product of the best manufacturers? If not, then it is claimed that we have always used a solution of H_2O_2 with acids present.

Further experiments repeated several times with the same samples showed the effervescing action when the peroxide was applied in root-canals, whether there was pus present or not; and also that when the drug was placed in contact with pus outside of and away from a tooth, there was no evolution of gas. The next step was to free the H_2O_2 from all acids, when he failed to see any evolution of gas whatever, in the canal or out of it, in contact with pus or away from it, in the mouth or in the tooth out of it. The last experiment was with HCl by itself, used almost full strength, and it produced almost the identical phenomena as those by H_2O_2 in the first place, evolution of gas and all.

Although H_2O_2 should not be claimed to be what it is not, it certainly is a valuable combination as a detergent and germicide. Dr. Black says HCl is one of the best antiseptics. Therefore we may use the mixed product with propriety, with a perfect understanding of its nature.

Dr. C. N. Peirce, Philadelphia. It must be recollected that the tooth referred to in the paper as having been experimented on by the speaker was largely affected by excementosis, and the great surprise was the rapidity of the removal of the abnormal growth and the cementum, while the agent, whatever it was that produced the results, acted so slowly on the dentine and enamel.

Dr. Frank Abbott, New York, while pleased with the paper, thought it sad that peroxide of hydrogen should have been used for so many years under the delusion that it was a test for the presence of pus; whereas these experiments of Dr. Stubblefield's seem to prove that it is no test whatever, any more than hydrochloric acid slightly diluted. No doubt many other substances would produce the same result in the root-canal of a tooth.

Dr. George J. Friedrichs, New Orleans, while acknowledging that he knew the peroxide of hydrogen he had been using was impure, still thought there was an excellent use for it. The hydrochloric and sulphuric acids placed in it to preserve it are just in the proper proportions to stimulate and heal. When injected into an abscess, from which it is difficult to evacuate the pus, the heat disorganizes the compound, the oxygen is given off and drives out the fluids in the cavity, just as a charge of powder drives the shot from the gun.

Dr. James Truman, Philadelphia, while delighted with the results of Dr. Stubblefield's work, should continue to use hydrogen peroxide just the same as heretofore, for practically the reason stated by Dr. Friedrichs. It is one of the most valuable agents, whatever its composition, and it would be a mistake to abandon its use. He affirmed that in cases of abscess which failed to yield to other treatment the hydrogen peroxide has given the best results, and he knew of no agent so effective in treatment of necrosis of the jaw. Although it has a black eye to-day, let us remember the good work it has done. Much that is used is valueless, because being kept in too warm a temperature it becomes merely water. It should be kept cold all the time. Its forcing out of pus is not so important to him as its germicidal action; under certain conditions we have no better agent than hydrogen peroxide.

Dr. L. C. Ingersoll, Keokuk, Ia., has long felt what has just been stated, that hydrogen peroxide is probably not a true chemical compound; the oxygen is held in combination by force, not by affinity. He has tried it under various circumstances which convinced him of its instability, and he has never had the confidence in peroxide many have had, because it lacks one element absolutely essential in antiseptic treatment, and that is a stimulating property. It must therefore be used in connection with some stimulating drug, because in nearly every instance there is more or less morbidity of function. Also, it behaves badly in a closed wound, as, for instance, in antral diseases. If the opening into the nares is closed, and the cavity has not sufficient artificial drainage, the cheese-like sediment formed by the action of the drug on the pus is an irritant, and the expansion of the gas evolved causes a continuance of the pain for several hours. There is an inclination to trust new medicines too exclusively and throw aside other things which were used successfully; he therefore wished to offer a word of caution against trusting the peroxide of hydrogen on all occasions where there is a pus-formation.

Dr. W. P. Horton, Cleveland, O., carefully syringes out the pockets with warm water and chloride of sodium where the pus is supposed to be, previous to using the peroxide, and he has no such effects as Dr. Ingersoll has spoken of.

Dr. John S. Marshall, Chicago, has had the same experience in the injection of peroxide into the antrum as was described by Dr. Ingersoll, and he has therefore abandoned its use for that purpose. He has also abandoned its use in the treatment of alveolar abscess, because of an experience in treating a lower first molar which had been drilled through to the bifurcation of the roots in an attempt to open up the pulp-chamber some three years previous to his seeing the case. When the blood flowed, the operator thought he had struck the pulp, and he put in arsenic to devitalize it. This of course went through and caused necrosis of the septum between the roots, and there had been a constant discharge of pus from the outside. On probing, the speaker found no necrosed bone, but a carious condition existed. He cut away the carious bone and attempted to wash it out with peroxide of hydrogen, but instead of coming out where it should, it extended along the jaw, causing a welt on the side of the face inside of two minutes. He cut down to it through the gum with a lancet to give exit to the gas, but it took several weeks to cure the trouble caused, and he then said that that was the last time he would use peroxide in such a place.

Dr. D. R. Stubblefield, Nashville, Tenn., in closing the debate, thought Dr. Truman's practice correct in using the peroxide under the circumstances suggested, but it is unnecessarily troublesome when the aromatic sulphuric acid might as well be used on necrosed surfaces. The valuable agents in this compound are undoubtedly sulphuric and hydrochloric acids. With reference to the stimulating action mentioned by Dr. Ingersoll, these two acids would seem to supply sufficient stimulating power. The speaker has found that where there were sloughing margins and pus-pockets, if he could carry the acid thoroughly to all the surfaces, as with a little sharp stick, the detergent effect was followed by a healthy growth. His opinion is, that the excessive pain in the antrum after the injection of peroxide is the effect of the sulphuric acid proper in contact with water. As is well known, in diluting the acid, it must be added to the water, as pouring the water into a quantity of the acid will produce an explosion. If this fluid is thrown into a cavity where it is too closely confined, we have that peculiar effervescence which is probably a kind of coagulation produced by the action of the acids, and then the distention and elevation of temperature brought about by the acids produces the pain.

Dr. E. Parmly Brown, New York, considers the question of banding roots for crown- and bridge-work an open one, being led to that conclusion by incidents showing the damage wrought by improperly constructed or adjusted bands upon the roots. He has always been an advocate of not banding, except when it cannot be helped; but when the bands can be so devised as not to injure the periosteal membrane around the necks of the teeth and can be put on without disturbing the patient more than the average dental operation, their use is proper. In the present state of the art bands should never be of gold, but always of platinum, because it will stand the heat for baking or soldering while one of gold will not. He wished to present a band which he believes to be entirely new. It should be made of platinum, No. 30 to 36,—very thin,—always as thin as it can be got to do the work with. Wrap it around and lap the ends, just as in making a gold band, put a piece of No. 30 to 60 rolled pure gold between the laps, with a little flux, solder the ends, file down, and fit on. When properly fitted, mark inside the root-margin, take it off, and with a fine-pointed pair of scissors slit right down to the mark, say ten slits. The band will then bend over like pure gold. The best adaptation is made with the aid of the electric plugger,—if you have none, any other plugger will do,—by working around with the cap held in place by an instrument or wood point. The case exhibited is one made day before yesterday. The platinum band is not fastened onto the two-pin bicuspid crown. In extreme cases, when there is no time to solder, it may be cemented on without soldering, and the band may be burnished and undercut. Many roots have decided undercuts. In most cases he bakes on porcelain and covers up the band in front, fixing it so there is room for a little film of porcelain in case of recession. There is a lady present in whose mouth is an operation which can be seen by any who are anxious to see the work in practical use.

It is proper to cut off teeth and crown them when ladies wear unsightly gold fillings. We are justified at the present time in cutting off teeth which five years ago it would have been considered serious malpractice to cut off. A short time ago a lady had come to his office, and, pointing to one of her laterals, said, "I want that tooth crowned." She said she could not get anybody to crown it, and mentioned the names of a number of eminent dentists, several of whom are present here, who had refused to cut it off on the ground that it would be malpractice. That tooth had preyed upon her mind until she was really morbid about it. He was not ashamed to say that he cut it off and crowned it. That was two months ago, and the lady is married now. She said, "This has been a nightmare to me for twenty years, all day long." She would look at her sisters, who were much handsomer than she, and she laid the difference all to that tooth.

Dr. W. B. Ames, Chicago, described a method of making a close, almost hermetically-sealed joint between gold and porcelain, in crown- and bridge-work, by lapping pure gold, thin enough to burnish nicely with the porcelain, by which means the solder is carried between the porcelain and the gold cap, making an accurate cap. The specimens were sent by Dr. Hollingsworth, of Kansas City.

Dr. C. C. Carroll, Meadville, Pa., would not have cut off the unsightly lateral to get a root to band, as Dr. Brown did, but would do as in the case of a New York lady who went to Paris, where she fell into the hands of a distinguished practitioner. Here is an impression of the case as finished by him. The two front teeth were filled with gold ; the anterior approximal corners were cut off and filled, but contour was not permitted on account of the unsightliness of the gold ; the lateral was cut off, the root banded, and a crown inserted. A V-shaped piece of porcelain was inserted to supply the anterior corners of the two front superior incisors. This was backed with gold and hung to the left lateral incisor root with a banded pivoted crown inserted upon it. Every motion of the piece disclosed its artificial character. Alveolar abscess of the lateral ensued, and the case came into the speaker's hands. After treating the abscess, he cut the posterior angle of the centrals sufficiently to allow two Weston crown facings to be placed over them, took an impression of the parts in relation, made a model with aluminum model and investing material, mounted the facings over the centrals and a common pin-tooth on the lateral root, and waxed up neatly as intended to be worn. Then the model with the teeth *in situ* was invested and the bridge as constructed was cast complete in aluminum, including the post that passed into the root-canal. When finished, this denture telescoped neatly over the incisors with the lateral in position on the root, and was cemented in place, making a substantial bridge restoration with a very natural expression. He has used this form of bridge-restoration in many cases with great satisfaction, conserving the teeth with living pulps instead of the usual sequence of cutting off the crowns at the gum line, abscess, and often the loss of the teeth.

The Section was passed.

Section II, Dental Education, Nomenclature, and Literature, was called, and the report was read by Dr. Louis Ottofy, of Chicago, secretary of the Section. An abstract follows.

The Section takes pleasure in reporting that there has been no practical increase during the year in the number of colleges in operation in the United States,—thirty-three. At the commencements held since the last annual meeting there were graduated 1241 persons, making the total number of graduates during the past six years (1886–1891) 4846. Of the graduates this year, thirteen colleges together contributed less than one hundred ; eight more about two hundred and fifty; while the remaining nine hundred—three-fourths of the entire number—came from twelve colleges.

The principal work of the Section during the year consisted in endeavoring to increase the interest of state and local societies in this association. A list prepared shows that there are over a hundred societies, as follows: national, 4; inter-state, 7; state, 41; district, county, and local, 22; city, 29. Of these, twenty-two were represented in this association last year. Eighty-two societies and twenty-nine states were wholly unrepresented. A circular sent to these societies has already borne fruit, as a number of the papers so far read at this meeting have been written as a result. It is now the intention of the Section to request every local society to appoint some one to make a report of its proceedings for this association, and to send those who make the reports as delegates to our next meeting. It is also its desire to publish annually a corrected list of dental societies, and to keep a record of their membership, now numbering about four thousand.

The Post-Graduate Dental Association of the United States has established a course of study, embracing three years' reading of strictly dental works for practitioners who are not graduates, followed by an examination, with a certificate to successful candidates, who are then expected to take a post-graduate course in some dental college. On the completion of this they are entitled to full membership in the Post-Graduate Dental Association, and may then take a course of advanced reading, comprising the collateral sciences and general literature, with a certificate as the reward of a successful examination. The aim is to educate and elevate practitioners whose early education has been neglected, and in no wise to conflict with the dental colleges.

Dr. Jacob L. Williams, of Boston, again presents the term *oristry* for adoption in place of dentistry, as comprising all branches of treatment of the oral cavity.

The Section presents one paper by Dr. C. R. E. Koch, of Chicago.

Dr. C. N. Peirce read Dr. Koch's paper, which was entitled "State Boards the People's Officers, and the Profession."*

Dr. Abbott thought the contents of the paper, on the whole, very good, but he did not like the general criticism, or general slur, that colleges or faculties of colleges sell their diplomas for thirty dollars. This is neither proper nor justifiable, and particularly coming from a man who holds no diploma at all, and who really knows very little about dental colleges.

Dr. Patterson. He holds an honorary diploma.

Dr. Abbott. That is just equal to nothing at all. No doubt the writer speaks feelingly because he is located in a community of colleges, but it is not fair to judge all institutions by a few bad ones. The encouragement of dental education by everyone connected with the profession is laudable, and it should be aided whenever possible. The state boards of examiners are very well in their way, but they should not be allowed to examine a man who does not come to them with a reputable dental college diploma. It is neither fair nor right for a board of examiners to pass a man who has been rejected by a dental college, nor one who has taken but one course of lectures, as has been done by the very board of which the writer of the paper is a member. There is no reason nor justice in the law which permits such things. It marks an injury to the colleges and the profession, and is an outrage upon the community.

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* See page 974, current issue Dental Cosmos.

Dr. J. Y. Crawford, Nashville, Tenn. Outside of scientific questions pertaining to the art of dentistry, legislation is the most important subject that addresses itself to the dental profession to-day. One plea in the paper was that the people demanded and were interested in the enforcement of rigid laws. The fact is that there is not a sufficient number of competent dentists in America to serve the American people, and therefore the discouragement of legitimate institutions of learning is contrary to the better interests of the whole people. Although not a college man, he would say that there is no profession whose institutions of learning are so universally respectable as the dental colleges of America, and while the people and the profession need protection, these institutions of learning need some protection and encouragement, too. While not one to make a go-between, there is a go-between which he would accept, to let each state say that a diploma from a reputable college shall admit to practice without further examination, but give each state board the authority to pass upon the reputability of the diploma. He would oppose the adjudication of this last question by a national board, as a violation of the state's right. The Tennessee law, in providing that when the board has passed favorably upon the reputability of an institution of learning its parchments ought to be a sufficient guarantee, is a model in this respect, and offers a satisfactory solution of the question, which accords everybody his full rights. Reputable institutions will thus have their diplomas recognized, and the disreputable will go out of existence for want of patronage, because the board in solemn judgment, under oath, will say that its teaching is not conducted in accordance with the best interests of the country. One other thing: when this law was before the legislature of Tennessee, every member of the Senate, with one exception, said that diplomas ought to be recognized; nine out of ten reputable dentists will say so, as will any competent juror.

Dr. J. E. Cravens, Indianapolis, indorsed Dr. Crawford's position.

Dr. W. C. Barrett, Buffalo, N. Y. The colleges are sometimes viewed with suspicion through ignorance of their practical work, and the charge is covertly intimated or openly made that they are close corporations organized for the express purpose of making money. But what would we be without schools? The examining boards offer no means for education, and cannot take their place. The colleges are the only sources of instruction, and their hands should be sustained. Why should not the two work in harmony? Too often men are appointed on boards who are themselves unacquainted with the methods of education. How shall they determine technical educational matters? A board, the members of which have not been scientifically educated, may desire honestly and conscientiously to determine the amount of information an applicant possesses, but they are unacquainted with the process by which he obtained his knowledge. They are intent upon technical knowledge, and having learned certain questions and answers, are indignant that the graduate, who may have passed a creditable examination for his diploma, cannot give the deep origin of one of the cranial nerves, though if they went further they might find that he knew perfectly the function of that nerve, of the physiology of which the examiner may be totally ignorant. How many here present could answer questions concerning the origin and insertion of the principal muscles? Yet examiners demand this technical information, instead of educing from the applicant what he really knows of the principles of practice. That is an unjust method of examining the student. He would not accuse the boards of willful injustice, but with the best intentions in the world, their methods, unless they are themselves experienced instructors, may be such as to work a grievous wrong to a worthily equipped man. He heartily favored the idea of a national board of examiners,—their duties to be to see if the state boards of examiners are qualified for their positions. There are two sides to this question of qualification: the critic should demonstrate his fitness to sit in judgment.

Very frequently the boards themselves have obtained the legislation which makes men without special fitness the judges of the schools. No one questions the purity or the honesty of their motives; then why should the purity and honesty of the educators be questioned? Because they demand a fee for conferring the diploma? So do the boards. In New York they demand a fee of twenty dollars for the conferring of a diploma which represents no teaching whatever. The matter of fees should not enter into this discussion, for there is no principle involved in that. Educational boards and the colleges must come together, must harmonize their views, or there will be a disruption. There must be an appeal to the courts to establish the right and to find out whether a general diploma from a recognized college is good for anything. These acknowledged points of friction must be removed, and the boards and dental colleges brought into sympathy. Both have important functions,—that of the college the more momentous, in his opinion, because it is the basis of the whole thing. Is it strange that a college should object to having judgment passed upon it by men who in many instances are not qualified for the office they arrogate to themselves? That is the principal complaint of the colleges, as he understands it.

On the other hand, there are schools which are conferring degrees without the proper qualification on the part of students. If such schools are to have no supervision, what is to become of our educational system? There must be some power to force them into compliance with the universal educational law. One complaint on the part of the colleges is that the boards do not attempt to drive out of existence those schools which are notoriously disreputable, but confine their attacks to those which are doing their best to raise the standard of dental education. The solution of all this may be found in a thorough examination by an authority none can question into the methods, equipments, and thoroughness of each school. The methods of every school should be passed upon by examining boards competent for the task, and that done their individual interests in granting degrees should not be questioned. He has advocated for several years that no teaching faculty should confer its diplomas. It is the duty of the teachers to teach, not to confer honors. With a state board of regents, before whom should appear the students from every college, and if found worthy receive their degrees, as with the medical colleges in New York State, the schools would devote themselves entirely to the education of the youth, and they would no longer be open to the charge that they were working for money alone.

Dr. J. D. Patterson, Kansas City, would like to hear from the other side.

Dr. J. N. Crouse, Chicago. If this association is ever to accomplish what it should accomplish, we must get at the fountain-head for the Section reports, must have a report of whatever is being done in the local societies. An effort was made in this direction this year, and though imperfectly understood was the means of bringing more matter to the Sections for report than ever before. When thoroughly understood and properly managed there will be no complaint of failure of the Section plan, but instead the association will have a great future, when all that is done of importance in all the societies is reported at its meetings.

The subject was passed.

Dr. Abbott moved that the Executive Committee be instructed to make such arrangements with The S. S. White Dental Manufacturing Company for the publication of the Proceedings as formerly existed.

The motion was adopted, after discussion.

Adjourned to 4 o'clock P.M.

Afternoon Session.

The afternoon session was devoted to the election of officers and the selection of the next place of meeting, reported in the DENTAL COSMOS for September, page 768.

Evening Session.

The association was called to order at 8.35 P.M., the president, Dr. Harlan, in the chair.

The committee on the president's address submitted its revised report through its chairman, Dr. Barrett.

The report proposes a radical change in the method of conducting the affairs of the association, providing for the election of an executive council; for the holding of the regular session of the association in the morning and evening, at which no business aside from the reading of papers, the reports of officers and standing committees and the discussion of scientific and professional subjects shall be introduced; special sessions may be called by the executive council during the afternoons, for the transaction of business, except that of the third day of the meeting, when the election of officers and selection of the next place of meeting are to be held; for the selection of the time as well as the place of meeting annually; for the appointment by the executive council before the close of each meeting of a supervisory committee of work, consisting of five members, to whom shall be referred all papers of a professional or scientific nature and all appliances and improvements in dentistry, to be referred if approved by them to the appropriate Section for presentation in the annual report; and for the appointment of a committee of three for each Section who shall have charge of the work of their several Sections and submit at each annual meeting a report comprising a full account of the status, advancement, and improvements made in their respective fields. The amendments to the constitution required for the accomplishment of these changes are embodied in the report.

On motion of Dr. Fillebrown, the committee was continued and authorized to receive suggestions from the members for thirty days, to be incorporated in the report to appear in the Transactions, such publication to be deemed sufficient notice of proposed amendments to the constitution to allow a vote to be taken next year.

Drs. J. B. Rich and Corydon Palmer were elected permanent members under the resolution respecting those who have been in reputable practice for fifty years.

On motion of Dr. H. A. Smith, an appropriation of $500 was made for the continuance of the examination of crania; and on motion of Dr. Ottofy, the committee having the matter in charge (Section VI) were authorized to solicit aid from the various local societies; the Transactions of the association containing the records of this work were directed to be forwarded to all societies which have contributed or may contribute in aid of it.

Dr. Taft, chairman of the committee on necrology, reported a tribute to the memory of the late Dr. W. H. Atkinson. Brief eulogies were pronounced also by Drs. G. J. Friedrichs, Horton, Barrett, Butler, W. H. Morgan, Crawford, Patterson, Corydon Palmer, and Dwinelle; and a committee, consisting of Drs. J. S. Marshall and C. S. Stockton, was appointed to co-operate with those societies which have taken steps toward preparing a memorial to Dr. Atkinson.

Section III, Operative Dentistry, was called, and Dr. V. H. Jackson, of New York, read a paper entitled, "Methods of Regulating Teeth."*

Dr. N. S. Hoff, Ann Arbor, secretary of the Section, read the report, of which an abstract follows.

As even a brief synopsis of all that has been written or said in discussion upon operative dentistry would make too tedious a report, a brief *résumé* only will be attempted, to show the tendency of thought and activity toward unification of the principles underlying practice and especially as they appear likely to modify future methods. It is noticeable that frequently the discussions following a paper develop the most practical ideas, frequently transforming an indifferent paper into one of great value. The thought occurs, Why cannot a condensed abstract of all meritorious papers and discussions before local societies be referred to the proper Section, and from there be distributed in print to the various members for criticism, to be then presented at the annual meeting for final discussion? It is gratifying to notice that methods of practice are not now received so much as formerly on the dictum of some popular man, but are first made to undergo scientific scrutiny.

Probably the most notable contribution to our periodical literature this year has been the series contributed to the DENTAL COSMOS by Dr. G. V. Black on the "Management of Enamel Margins," containing as they do scientific reasons for methods familiar to every practitioner, for which reason they are earnestly commended as marking an era when the practice of dentistry shall be placed upon a true scientific basis. Other interesting papers which have elicited profitable discussions were "The Preparation of Teeth for Filling," read by Dr. Edmund Noyes at the Illinois State Dental Society; "The Treatment of Approximal Surfaces," by Drs. George A. Wilson and W. H. Dwinelle, before the New York Odontological Society.

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* This paper will appear in the DENTAL COSMOS for December.

From a discussion before the Maryland State Dental Association on a paper presented by Dr. C. M. Gingrich, in which he took the position that cohesive gold does not possess as many advantages for a filling-material as non-cohesive, it appears that the author's view is not wholly confirmed, but that the practice of strictly non-cohesive filling is passing away, and that the practice of to-day embraces all materials singly or in combination and all methods of practice that are reasonable and exact. The combination of tin and gold continues to claim the favorable opinion of the profession, a careful examination of the literature of the year justifying the statement that tin and gold in combination are more favorably received and used than any of the plastic materials. Copper amalgam, which three years ago seemed to promise so much, is now severely condemned because of failures resulting from a gradual wasting away of the material in the tooth from supposed chemical or electrolytic action generated by an abnormal condition of the saliva. Dr. W. B. Ames read a paper before the Mississippi Valley Dental Association in which he explains that this is due to imperfect amalgamation, and claims that when the copper precipitate is carefully amalgamated and the amalgamation has not been disturbed by heat or grinding, the material will have stability and permanence in the most acid mouth. The use of gold in combination with cements and with amalgam has been advocated, in the former case on the ground that the cement, besides assisting in securing anchorage in frail teeth, without undercuts, will prevent encroachment on the pulp; the principal claims for the amalgam combination are that difficult cavities are readily filled, and amalgam at the cervical borders or at the bottom of a cavity acts therapeutically. Dr. J. E. Cravens has used satisfactorily for a year past a thin section of gutta-percha to make the joint under gold fillings at the cervical border.

Dr. W. D. Miller's researches with reference to oxyphosphate cements (DENTAL COSMOS, January, 1891) lead him to the conclusion that they should be used with caution as pulp-cappings, always with some non-irritant intervening, and that they are inferior to oxychlorides as root-canal fillings. Immediate root-filling, judged by the silence on the subject, has almost become one of the lost arts, and the fallacious idea that a pulp once fully denuded of its natural covering cannot be artificially protected is giving way to the more rational idea of conservation. In the February (1891) DENTAL COSMOS is a paper by Dr. A. W. Harlan, on "The Destruction of the Dental Pulp and Methods of Treatment of Teeth Discolored by its Retention in the Pulp-Chamber or Canals,'' which presents a unique and rational treatment.

Several new remedies are worthy of mention: Aristol, a composition of iodine and thymol, as an agreeable substitute for iodoform; Dr. E. C. Kirk describes its use in pyorrhea alveolaris, alveolar abscess, and as a dressing for root-canals, in the DENTAL COSMOS for July, 1891. Dr. Miller predicts that trichloride of iodine will prove as good or a better germicide than bichloride of mercury, and it is much less poisonous. Dr. C. F. W. Bödecker has used aquozone (made by forcing ozone into distilled water containing a small quantity of hypophosphites and phosphates) with gratifying results in necrosis and other diseases. Its advantages over peroxide of hydrogen, commonly employed, are that it is more stable, contains no acid, will not become acid, is harmless and an excellent germicide. Pyoktanin promised to be a very effective antiseptic, but clinical use proved its insufficiency, and its staining property has excluded it from operative practice.

After mentioning the books of the year, the report concluded with the announcement that the work of the Section had been divided into departments, reports from which would be read.

A report on Dental Instruments and Appliances, prepared by Dr. A. W. McCandless, was then read, in which the following appliances were commended: The Ladmore-Brunton clamp and matrix; the Fletcher and Marshall matrices, and a cervical clamp by Dr. Keefe; sand-paper disk-holder by Dr. Rowe; disk-holder and waste-pellet receiver, by Dr. Kimball; dental electric heater and points for gutta-percha, by Dr. Faught; the Thomas dental electric engine, and Gilmer's electric root-drier; the Davison separator; the new burs, absorbent cotton rolls, glass mixing tablet for cements, and Flexo files by The S. S. White Dental Mfg. Co.; asbestos phosphate dentoplast and asbestos chloride dentoplast by Dr. E. Parmly Brown; bur-sharpener by Dr. E. P. McLean; capsicum plasters by Dr. B. H. Teague; and Dr. Mewborn's mulley mallet.

Dr. L. E. Custer, Dayton, O., read the report on Obtundents and Local Anesthetics, which summarized the various agents and methods in use to obtund sensitive dentine and to produce local anesthesia. Previous to the introduction by Dr. Ottolengui in 1888 of the sulphuric ether spray, the application of arsenic or a like agent which resulted in the death of the pulp was the only means for producing complete anesthesia of the dentinal fibril. But even this, which acts by abstraction of the heat, may kill the pulp if the temperature is reduced too far, indicating that it should be used only in extreme cases. Dr. Otto Arnold then suggested a spray of nitrous oxide for the purpose, but this did not attract attention till Dr. G. L. Curtis read a paper and exhibited an appliance for its use before the New York Odontological Society in 1890. Ether volatilizes at 96° F. and nitrous oxide at 148° F. below zero, producing such intense cold that the parts are quickly benumbed. The objections to this method are the unwieldy apparatus necessary, the irregularity of the flow, and the danger of so powerful an agent. In 1889 Dr. M. L. Rhein introduced chloride of methyl as a cold-producing agent. The boiling point of this agent is 73° F., and it is, therefore, between ether and rhigolene, volatilizing with the warmth of the hand with sufficient force to produce a continuous spray. It is capable of reducing the temperature to about 40° below zero, which gives it a range wide enough for ordinary purposes. It requires no apparatus for generating a blast, as with ether, and may be carried to the tooth through a rubber tube and the flow regulated by a thumb-valve; it produces more intense cold, hence the pain following its application is briefer and the obtunding effect lasts longer than with ether. It is, however, a general anesthetic, and is likely to be inhaled during the refrigerating process, and is so far rather expensive. Chloride of ethyl is the last agent of this sort introduced. It resembles the methyl in many respects. It is a colorless ether, having the formula C_2H_5Cl, and an ether odor. It volatilizes at 50° F. It is a French product, and comes in hermetically sealed three-drachm glass tubes, one end of which is drawn out to a fine point. The directions are to "break off at the file-mark." This will do for its use as a local anesthetic, but for obtunding sensitive dentine the opening at that point is too large, whereas if the point is ground off with a corundum disk about a quarter of an inch farther toward the end, the jet will be so attenuated that if held at a little distance from the cavity it reaches it just as it is breaking up and is rapidly volatilizing. The advantages of chloride of ethyl are similar to those of the methyl. It requires no apparatus for generating a blast. The form in which it is supplied is neat and the usual size of dental instruments. It is effective.

Another class of obtundents utilize heated air carrying a vaporized agent. Their virtue lies in the heat, and the vaporized agent is of no value unless it has an affinity for water. The small obtunder consists of a cylinder inclosing a cartridge containing absorbent material saturated with alcohol, with a heating bulb and proper points. The use of alcohol commends this instrument. The Milton obtunder consists of a medicating chamber immersed in a water-bath kept at blood heat. Compressed air is passed through it, carrying the vaporized agent to the cavity of the tooth. Agents which volatilize easily are contained in an outside vessel which communicates with the medicating chamber. The inventor says oil of cloves, cinnamon, cajuput, eucalyptol, or thymol may be used, but he recommends the following formula:

℞—Gum camphor, ʒvi ;
Carbolic acid, ʒiv ;
Acetanilid, ʒi. M.

The application, being of the normal temperature, is not painful ; but the desiccating process is slower than if a higher temperature was used. The Richmond apparatus consists of a perforated cartridge containing cotton saturated with carbolic acid, oil of cloves, cinnamon, and wintergreen, equal parts. Compressed air passes through this, and being heated is charged with the volatilized compound.

Since the discovery of cocaine no local anesthetic *per se* of any value has been introduced. The only change has been in its combination with other agents. It is beginning to be seen that cocaine is a dangerous agent, a number of deaths having occurred from its use recently. This may be partly due to its combination with other agents, but its uncertainty, even when used alone, makes it dangerous, and when symptoms of poisoning arise from a combination of agents the operator is at a loss to administer the proper antidote. The tendency is to lower the percentage of cocaine solutions for injection, two per cent. being now generally recognized as proper.

The number of local anesthetics recently patented is surprising, and when the composition of some of them is known it becomes alarming. The last good work done by Dr. J. W. White was to sound a note of warning against these nostrums, most of which are formulated by persons of not very marked attainments. No one has a legal or moral right to inject into the circulation of a patient a substance the composition of which is unknown.

Since the introduction of new refrigerants for obtunding sensitive dentine, local anesthesia by refrigeration has been revived. Bromide of ethyl, chloride of ethyl, chloride of methyl, and nitrous oxide carefully manipulated, are used with apparently good results, but owing to the rapid circulation in the parts are not so effective as the injection of cocaine about the tooth.

Adjourned to 9 o'clock to-morrow morning.

(To be continued.)

ANNIVERSARY MEETING OF FIRST DISTRICT SOCIETY, NEW YORK.

THE First District Dental Society will hold its usual great meeting in the early part of January, 1892 ; the exact date will be made known as soon as positively decided upon. The essayists have already been engaged, and are all distinguished gentlemen. In addition, each paper will be discussed fully by prominent men, who have made special study of the topics.

The clinics will be managed upon a somewhat novel plan. Nothing will be offered that has ever been shown before. The committee prefers to have a single clinician (if no more can be found) who will give a new and valuable clinic, rather than to have a program distinguished by quantity rather than quality. Gentlemen who have entirely new methods, medicinal agents, or instruments, which they will offer, are invited to communicate immediately with Dr. F. A. Roy, 148 W. Seventeenth street, New York, chairman of the clinic committee. Every facility will be afforded to enable the largest number to witness the demonstrations.

It is confidently expected that all the prominent dentists will be in attendance, and all are invited.

M. L. RHEIN,
G. A. WINKLER,
RODRIGUES OTTOLENGUI, *Chairman*,
Executive Committee.

OHIO STATE DENTAL SOCIETY.

THE Ohio State Dental Society meets at "Hotel Chittenden," Columbus, O., December 1, 2, 3, 1891. Papers will be presented by Drs. Wright, J. Taft, H. A. Smith, Junkerman, Raffensperger, W. Taft, Callahan, Sage, Jere E. Robinson ; also by Drs. A. W. Harlan, of Chicago, A. O. Rawls, of Kentucky, W. S. Elliott, of New York, and others.

Clinics and practical demonstrations will be given in glass fillings, gold tippings, inlays, combination fillings, crown- and bridge-cases ; also exhibitions of electrical and other appliances for dental practice.

The sessions begin promptly at 9 A.M., Tuesday, December 1, 1891. On Wednesday evening there will be a banquet at "Hotel Chittenden," to which every member and foreign guest is cordially invited.

Visitors from distant states will receive a hearty welcome.

OTTO ARNOLD, *Secretary*,
62 E. Broad St., Columbus, O.

MARYLAND STATE DENTAL ASSOCIATION.

THE ninth annual meeting of the Maryland State Dental Association will be held in Baltimore, at the St. James Hotel, commencing Monday, December 14, 1891, at 8 P.M., and continuing through the 15th and 16th. Valuable papers will be read and exhibits made.

A cordial invitation is extended to members of the profession, and especially to those residing in the State of Maryland, to be present.

F. F. DREW, D.D.S., *Corresponding Secretary*,
701 N. Howard St., Baltimore, Md.

EDITORIAL.

CHEMICAL ANTISEPSIS.

THE question of chemical antisepsis, if we may judge from present indications, is suffering from an incubus due to too much guesswork and a lack of accurate, unprejudiced, experimental investigation.

Its close relation to the germ theory of disease has led to certain misunderstandings regarding its possibilities. The brilliant achievements of Pasteur and Koch in general, and of Miller in dental bacterial pathology, whose experiments have proved to demonstration the causal relation of certain microbes to specified diseases, have in many cases led to reasoning somewhat as follows: Given the fact that microbes cause disease, it follows that the destruction of the specific germ, in each instance, is the correct line of therapeusis and prophylaxis. This led to elaborate experimentation looking toward the discovery of substances having the power of destroying pathogenic germs, and so far as laboratory experiments were concerned, many chemical substances were found to possess the destructive property required. Of these, none have received greater commendation or more general acceptance than mercuric chloride. In general surgery, gynecology, and obstetric practice, the use of chemical antiseptics, with at first carbolic acid and then mercuric chloride as the favorite and typical agent, became general. The clinical record was soon found to be a disappointing one as compared with the record of cases where chemical antiseptics were not used, deaths, particularly in laparotomy cases, occurring which were directly traceable to the use of antiseptics; and these were repeated with such frequency as to lead to the entire abandonment by leading surgeons of methods based upon the use of chemicals for the destruction of germs, and the substitution of prophylactic methods based upon conditions of absolute cleanliness.

It is of interest to note in this connection that the correction of the erroneous deduction, hastily made from laboratory experiments, as to the usefulness and safety of chemical antiseptics, has been made by the test of actual clinical use, and exemplifies the limitations of strictly laboratory investigation.

The more recent investigations are tending toward an elucidation of this failure upon the part of chemical antiseptics to fulfill earlier expectations, and two prominent factors, which at first were ignored or overlooked, are claiming attention, inasmuch as they constitute obstacles which, unless overcome, are likely to prove fatal to the general use of chemical antiseptics, at least in major surgical operations.

The greatest difficulty to be met is the high grade of vitality of certain pathogenic germs as compared with that of the tissue infected by them. This in the majority of cases being superior to that of the tissue, it is evident that the use of an agent sufficiently powerful to destroy the germs must also result in the death of the tissue-elements; and what has been stated in this connection of the germs themselves is found to be true in a higher degree of their spores.

Another difficulty, and one closely related to the foregoing, is the quantitative relation between the antiseptic—and the term is here used to signify a chemical substance having germicidal properties—and the amount of septic matter to be destroyed. It will be easily seen that while the qualitative relation of an antiseptic may be germicidal when minute amounts of septic matter are under consideration, the use of such a substance becomes quite a different problem when large areas of infected territory are to be treated for purposes of sterilization. For it must be borne in mind that sterilization by a chemical antiseptic is fundamentally a chemical process, involving a reaction between the substances operated on whereby both are altered in composition with a change of properties. This reaction takes place in harmony with the law governing all chemical changes,—viz: in definite proportions by weight, and to effect complete sterilization the amount of the antiseptic used must be in proportion to the quantity of septic matter present. To illustrate: whenever mercuric chloride performs its function as a germicide, it does so by virtue of the fact that it has entered into combination with some of the elements of the septic matter, and in so doing undergoes an alteration of composition whereby it ceases to exist longer as mercuric chloride, the action continuing as long as there is material for the sublimate to act upon, and presumably at the expense of its germicidal activity, for it has been shown that bacteria may be cultivated upon the coagulum resulting from the action of mercuric chloride upon albumen. If this line of reasoning should prove to be correct, the quantitative limitations of use for mercuric chloride must be extremely narrow, possibly not much, if any, beyond the safe physiological dose, unless under special and unusual conditions.

What has been stated of mercuric chloride probably applies in the main to all chemical antiseptics, and if true must necessarily greatly restrict the use of those which are active poisons. So far, the ideal substance is yet to be discovered, if chemical antisepsis, particularly as a therapeutic procedure, is to become a fixed factor in general surgical practice.

The dental aspect of the question presents some characters which require special consideration.

So far as sterilization of the oral tissues is concerned, either in health or when infected, the use of chemical antiseptics involves about the same restrictions as those which appertain to their use in general surgical work. In the treatment of pulpless teeth, however, they have a legitimate field, and their beneficial results are positive, simply because the factor of vitality of the tissue is absent and the problem is reduced to the simplicity of an ordinary chemical process. Perhaps nowhere in the domain of bacterial pathology or in the relation of chemical antisepsis to therapeusis have we a better example of the limitations of antiseptics than in the treatment of pulpless teeth. Given a tooth containing the highly septic débris of a putrescent pulp, and so long as no infection of the pericemental membrane has occurred, the sterilization of such a tooth by proper chemical treatment is a very simple matter ; but once let inflammation be set up through septic infection of the surrounding membrane, and antiseptics *per se* are powerless to control it,—or may even do harm.

The enthusiasm begotten of the discovery which announced the germ origin of diseases seems to have o'erleaped itself, as expressed by an unwarranted faith in the merits of chemical antisepsis ; but in the light of experience and investigation the pendulum is swinging back to a point where, rejecting the errors, we may hold fast to that which is good in it by reason of a just appreciation of its possibilities.

BIBLIOGRAPHICAL.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. A Yearly Report of the Progress of the General Sanitary Sciences throughout the World. Edited by CHARLES E. SAJOUS, M.D., and seventy Associate Editors, assisted by over two hundred Corresponding Editors, Collaborators, and Correspondents. Illustrated with chromolithographs, engravings, and maps. Royal octavo, volumes I–V, 1891. F. A. Davis, publisher, Philadelphia, New York, Chicago, Atlanta, and London. Price per set, cloth, $15.00 ; half Russia, $20.00.

It is sufficient to say of this well-known work that the series for the year 1891 maintains the high standard of previous years. The five volumes of which it consists cover the entire field of medical and surgical science most exhaustively. Not only are the usual departments of medicine and surgery amply represented, but such special subjects as Growth and Age (Vol. II, Section N), Traumatic Neuroses (Vol. III, Section N), Inebriety, etc. (Vol. IV, Section I), Medical Demography (Vol. IV, Section K), Histology and Microscopical Technology (Vol. IV, Section L), Bacteriology (Vol. IV, Section M), etc. The section devoted to Oral and Facial Surgery embraces a review of the recent work in dental disorders, anesthesia in dental practice, and dental reflexes, beside the usual matters relating to the surgery of the mouth and associate parts. An index of all the subjects treated is found at the end of each volume. An index of subjects considered in each section might be a useful addition, for an important function of this work is to save the time of the busy practitioner. T. B. S.

A COMPEND OF HUMAN PHYSIOLOGY, ESPECIALLY ADAPTED FOR THE USE OF MEDICAL STUDENTS. By ALBERT P. BRUBAKER, A.M., M.D., Demonstrator of Physiology in the Jefferson Medical College; Professor of Physiology, Pennsylvania College of Dental Surgery; Fellow of the College of Physicians of Philadelphia. Sixth edition, revised and improved, with new illustrations and a table of physiological constants. Philadelphia: P. Blakiston, Son & Co. Pp. 198. Price, cloth, $1.00; interleaved for taking notes, $1.25.

This publication, which is No. 4 of the "Blakiston Quiz Compends," and which has already received favorable notice in the DENTAL COSMOS, is again presented in a sixth edition, amplified by about fifteen pages and embellished with several new illustrations. It is an excellent example of this class of books.

PAMPHLETS RECEIVED.

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OBITUARY.

DR. CHARLES A. KINGSBURY.

DIED, at his residence in Philadelphia, after a brief illness of acute nephritis, CHARLES A. KINGSBURY, M.D., D.D.S., in the seventy-second year of his age.

While his health had always been robust and was generally good up to the time of his last illness, Dr. Kingsbury had suffered during the previous year from one or more painful attacks which prostrated him temporarily, though it was not suspected by himself or friends that they were of dangerous import. His sudden death came as a shock and surprise altogether unlooked for, as he was generally regarded by all who knew him as one who in the fullest sense enjoyed good health.

Dr. Kingsbury was born in East Windsor, Conn. His ancestors on both his mother's and father's side were among the early settlers of New England. His father died during the infancy of his son, and at the time of his mother's second marriage he removed with her to the home of his stepfather in northern New Hampshire, where he lived until his sixteenth year. During this period he attended school from six to eight months each year, and received the instruction common to the sons of New England farmers. He commenced to teach in the public schools of New England at the age of sixteen, attending the Wesleyan Academy at Wilbraham, Mass., and Newbury Seminary, Vermont, and teaching till he was eighteen, at which time he was nearly fitted to enter college.

In the spring of 1838 he commenced the study of dentistry in the city of Trenton, N. J., under the tuition of Dr. Nathaniel Bunn, who was engaged in the practice of dentistry, there being only two dentists in that city at the time. With a view to increasing his knowledge of mechanical dentistry, he placed himself under the instruction of Mr. Charles Houpt, of Philadelphia, a skillful dental mechanic, who enjoyed a large practice in this department. About this time he formed the acquaintance of Dr. H. H. Hayden, formerly of Windsor, Conn., but then practicing in Baltimore, and Dr. Horace Wells, the latter a cousin, the discoverer of anesthesia, from both of whom he received much valuable instruction. During the first year of his dental experience (1838) he conceived the idea of applying electricity as a therapeutic agent for the relief of dental pain, which he used frequently with satisfactory results, using apparatus constructed by himself. He was probably the first to make use of the agent for this purpose.

In 1841 he moved to Philadelphia, where he soon acquired a full practice. Shortly after his arrival he placed himself under the instruction of the late Elisha M. Neall, who enjoyed the reputation of being perhaps the most expert carver of block teeth at that time, and gained proficiency in this department.

The following year, yielding to the strong religious tendency which was at all times a prominent characteristic of him, and influenced by the advice of friends, he decided to enter the ministry of the Methodist Episcopal Church ; he united himself with the New Jersey Annual Conference, and was assigned to Haddonfield, N. J. He entered upon his work under most promising auspices, but before the close of the year his health failed, resulting in a laryngeal affection, and he was obliged to relinquish his charge. He remained in Haddonfield for three years, then removed to Mount Holly, N. J., where his health improved so that he was able to return to the practice of dentistry. During his residence here he studied medicine with Dr. B. H. Stratton, attended lectures, and graduated at the Philadelphia College of Medicine. In 1857 he removed to Philadelphia, where he continued in practice until his death.

Dr. Kingsbury was ever the advocate of higher dental education. He took an active part as one of the founders of the Philadelphia Dental College in 1863, and was elected to the chair of Dental Physiology and Operative Dentistry, which position he held for several years, and upon his resignation was elected professor emeritus. He was interested in the organization of the American Dental Association, the Odontographic Society of Pennsylvania, and the State Dental Society of Pennsylvania. He was a member of the Pennsylvania Association of Dental Surgeons, the Odontological Society of Pennsylvania, the Philadelphia Dental Club, the Academy of Natural Sciences, and numerous other scientific and philanthropic organizations. His contributions to the literature of dentistry were numerous and acceptable. Some fifteen of these, covering many departments of dental science and art from 1859 to date, were published in the DENTAL COSMOS.

Dr. Kingsbury was a man of recognized ability, a sterling friend, a most genial companion, kind and sympathetic, strongly individualized, and a man of unswerving devotion to the principles of right and honesty ; these he manifested nowhere more markedly than in all of his professional relations, both special and general. In his death the profession loses one more of the pioneers, whose enthusiastic devotion to its present interests and future advancement and whose identification with its early history forms a bond of union between its past and present which is fast being broken.

IN MEMORIAM.

At a special meeting of the Board of Trustees of the Philadelphia Dental College held October 5, 1891, a committee consisting of Dr. Charles P. Turner, secretary, Prof. James E. Garretson, M.D., D.D.S., and Laurence Turnbull, M.D., was appointed to prepare a minute expressive of the loss sustained by the board in the recent death of Emeritus Professor Charles A. Kingsbury, M.D., D.D.S., one of its most valued members. In accordance with this action, the following report was presented and adopted :

"Soon after the organization of the Philadelphia Dental College in 1863, Dr. Charles A. Kingsbury was elected to the chair of Dental Physiology, which position he filled most acceptably for a series of years. In 1864 he had the distinction of delivering the commencement address to the first graduating class. This address, as published in the newspapers of the day, has recently come to our notice, and may be characterized as brilliant, scholarly, and instructive.

"In 1869 he withdrew from the active duties of his chair, being then elected Emeritus Professor of Dental Histology and Operative Dentistry.

"In 1885 he became a member of the Board of Trustees, and during the past year was unanimously elected to fill the newly created office of vice-president of this board.

"In all these relations he labored faithfully for the advancement of the best interests of the college. His intercourse with the students, while based upon persistent and earnest effort for their rapid and substantial progress in the branch he taught, was also marked by a genial courtesy of manner which made him popular and acceptable in the class-room.

"As a member of the Board of Trustees the same estimable qualities endeared him to his fellow-members. We owe much to Charles A. Kingsbury for his earnest and successful efforts in many directions where good judgment and wise counsel were needed to secure prosperity to our institution. We shall sadly miss him, but his memory will long be cherished, and the good that he has wrought will abide in its far-reaching influence for many years to come.

"And now, while we deplore the loss the college has sustained in the removal by death of one so long connected with it, it becomes our privilege to tender our sincere sympathy to the surviving members of his sorely bereaved family.

"May Heaven vouchsafe to them consolation and peace in this dark hour of trouble."

Attest: Charles P. Turner, M.D., *Secretary.*

DR. DAVID ROBERTS.

Died, in Philadelphia, September 30, 1891, of heart-failure, David Roberts, D.D.S., in the sixty-ninth year of his age.

Dr. Roberts was well and favorably known for many years as a dental practitioner. Though he had not been in good health for some time, his affection was not considered serious. The night previous to his death he retired about eleven o'clock, and slept soundly until five o'clock in the morning. At that hour he arose, and while sitting on the edge of the bed was seized with a violent fit of coughing, dying almost immediately.

Dr. Roberts was born in Newcastle, Del., November 17, 1822. He was a self-made man. Until the age of fifteen years he attended the public schools of Newcastle, when he left home to earn his own living, and secured a position in a leather store in New York.

While still a young man he was appointed a clerk in the Philadelphia post-office, where he remained a number of years. He then began the study of dentistry under Dr. James L. Gilliams, and in 1849 commenced practice in Philadelphia. Afterwards he continued his studies at the Philadelphia College of Dental Surgery, where he graduated in 1854. For a number of years and until the time of his death he was secretary of the board of corporators of the Pennsylvania College of Dental Surgery.

In 1878, having amassed a sufficient fortune, he retired, and has since lived a comparatively quiet life. Dr. Roberts married Miss South, of Philadelphia, who survives him. There are no children.

DR. CHARLES P. GROUT.

DIED, in New York, October 18, 1891, of Bright's disease, Dr. CHARLES P. GROUT, in the fiftieth year of his age.

Dr. Grout was born April 1, 1842, at West Brookfield, Mass. He removed to Indianapolis, Ind., at the age of nine years, and studied dentistry with Dr. P. G. C. Hunt, of that city, after which he spent five years abroad. He returned to New York in 1868, where he successfully practiced his profession up to the time of his death. He was endowed with inventive and mechanical talent of a high order, and the Patent Office contains a large number of examples of his ingenuity. His work in crown- and bridge-work, of which he made a specialty for some years past, was equaled by few and rarely excelled.

He was endeared to his friends by noble qualities of heart and mind, and his professional relations were characterized by the determination to achieve the highest good for all who sought his services.

HINTS AND QUERIES.

HARMLESS SUBSTITUTE FOR COCAINE.—After considerable study and experience in the use of cocaine for the painless extraction of teeth, I have been forced to the belief that that medicine was not all that could be desired for the accomplishment of that end. On the 8th day of July, as an experiment, I injected distilled water into the gum around the tooth until the gum became almost perfectly white, and then extracted the tooth, with the result that there was very little or no pain. On successive days I performed the following operations with the following results:

July 8. Two badly decayed lower bicuspids, both ulcerated, without pain.
Second case. Lower left third molar, without pain.
Third case. Two upper third molars, considerable pain.
July 9. Lower right bicuspid, without pain.
Second case. Lower right first bicuspid, ulcerated, slight pain.
July 11. Lower left second molar, slight pain.
July 13. Lower right first molar, no pain.
July 14. Second upper right bicuspid, considerable pain.
Second case. Upper right second bicuspid, very slight pain.
July 15. Lower left first molar, very slight pain.

I have used it since July 8 in the above manner, and find that my success has been as marked as with cocaine, with no risk of poisoning. Having watched all the above cases, I found that with the exception of the last one they all healed rapidly and without soreness, while with cocaine most cases suffer from extreme inflammation of the gums.—DR. F. A. LANE, Macomb, Ill.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler.

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ORIGINAL COMMUNICATIONS.

RECIPROCATING TOOTH MOVEMENT. A STUDY.

BY HENRY N. DODGE, M.D., D.D.S., MORRISTOWN, N. J.

ON the 19th of February, 1891, a little girl ten years of age was brought to me in the evening by her mother, who had noticed something wrong with one of her daughter's teeth. Upon examination, I found a crack across the front of the upper right central incisor, less than a sixteenth of an inch from the edge of the gum. Passing horizontally across the labial surface of the incisor, this crack extended thence at either end to the mesial and distal sides of the tooth, and, being deflected sharply upward, disappeared under the gum. The tooth was broken across the front, and split off diagonally far up in the alveolus. Pressing the crown of the tooth gently backward with the finger, the living pulp appeared through the fissure, and when pressure was discontinued the tooth immediately resumed its normal position and the fissure closed.

The patient had fallen on the ice that morning, and a severe contusion of the lower lip immediately under the broken tooth, together with the line of fracture, suggested the conclusion that the tooth had been broken by striking the ice at the time of the fall. The little patient, however, was not conscious of any injury to the tooth until it was pointed out to her in the afternoon, nor had it caused her any pain. That same evening a splint was improvised,—a strip of gold plate perforated with four holes, tied across the lingual surfaces of both central incisors and cemented fast to protect the injured tooth from further accident. The case then rested for further consideration.

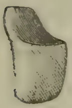
The parent of the child requested that everything possible should be done to restore the natural tooth, and clung to the hope that vital reunion of the parts might be effected. This, as the records show, might possibly occur, although highly improbable ; but still a sufficient number of authenticated cases justified delay, and the application at the next sitting of a more secure splint of gutta-percha molded upon the four incisors and fastened with ligatures and cement. The shortness of the teeth, and especially the lateral incisors, made it quite difficult to secure any fastening at all.

At length, after temporizing until the 2d of March, pus was seen to ooze through the fracture, and whatever hope of reunion had been entertained was thereupon abandoned.

It was now decided to remove the broken part of the tooth and replace the same upon the root exactly as before the fracture in order, if possible, to gratify the expressed wish that no artificial substitute should be employed.

In order to avoid injury to the crown by the use of forceps, a piece of strong bookbinders' twine was passed into the fracture and tied with ends long enough to be wound around the operator's hand. After the application of cocaine upon the gum, the crown was removed by one strong pull upon the twine, when it was found to present the appearance shown in Fig. 1, the figure being enlarged to show details. It will be noticed that the line of fracture, after leaving the labial surface of the tooth, extended obliquely across the root to its posterior or palatine surface, and there terminated at a point five-sixteenths of an inch above the margin of the gum.

FIG. 1.



In Fig. 2 a sectional view of the crown is given. This section was obtained in the following manner, without cutting the tooth: The crown was pressed edgewise into a softened piece of "modelling composition" until one-half of it was imbedded therein. After hardening the "modelling composition" in cold water, the broken tooth was removed, and the impression which it had made was filled, as a matrix, with amalgam, which when hard was filed to an even surface and photographed. Fig. 3 represents a cast made from the mouth at this point, with the broken tooth removed, the labial edge only of the root being visible, and the remainder lying deeply buried in the alveolus. The other incisors are also shown, immature and only partially erupted. In the root-

FIG. 2.

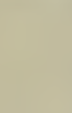
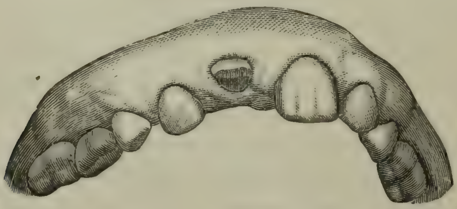


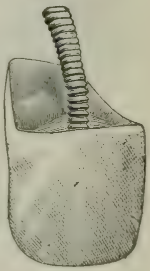
FIG. 3.



canal lay the remains of the living pulp, sensitive to the slightest touch. To apply arsenic now for its extirpation was out of the question, since it would be impossible to prevent it from coming in contact with the gum and pericementum, which might give rise to serious complications. The child was unable to endure surgical extirpation of the pulp, and the family physician objected to general anesthesia for the purpose of its removal. Resort was therefore had to frequent applications of pure carbolic acid to the pulp, causing repeated sloughings of the surface, until the canal was so far empty that a dressing could be retained. Then a broach wrapped in a shred of cotton was moistened in carbolic acid, the point lightly dipped in dry arsenious acid, of which all that could be removed was then carefully wiped off. With this poisoned point the living surface of the pulp was lightly touched once only with a twirl of the broach, and the orifice of the canal instantly closed with gutta-percha before the serum oozing from the overhanging gum could carry the powerful drug upon the surrounding tissues. Next day the pulp possessed so little vitality that the remaining portion of it was removed entire with one movement of an instrument, and measured half an inch in length. The canal, clean and free from débris, was thoroughly dried and wiped out with pure carbolic acid, and an immediate root-filling closing the apical foramen and upper third of the canal was made of a gutta-percha point packed tightly home with heated instruments. The remainder of the canal was temporarily closed.

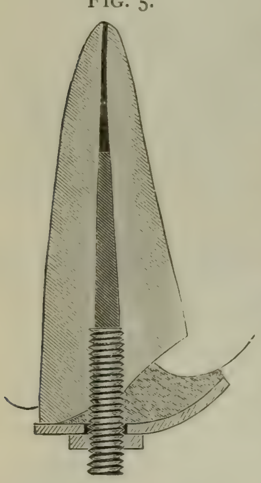
A piece of gold screw-cut wire was now cemented into the broken crown, as shown in Fig. 4. Before fastening this pivot or post in place the pulp-cavity of the crown had been enlarged, undercut, and shaped with a flattened floor. A piece of stiff gold plate, wider than the thickness of the wire, had been strongly soldered upon one end of the post and at right angles to it, forming a T-shaped foot that would rest upon the floor of the pulp-cavity and almost cover it. This foot had been dipped into thinly-mixed cement, and, being pressed into place, the remainder of the cavity above it had been filled with cement mixed stiffly and allowed to harden thoroughly. The free or upper end of the post had been slightly enlarged by hammering. A subsequent attempt to remove this post from the crown, in order to change its angle, resulted in failure, so firm was the fastening. The cement which had been removed was therefore replaced and the post bent in the desired direction, without splitting the crown, by grasping the wire with two pairs of delicate pliers. When the crown was first removed from the mouth the soft tissues closed firmly upon the broken root, and a question

FIG. 4.



arose of keeping the fractured surface dry long enough for a careful adjustment and fastening of the crown upon it. At first an attempt was made to force back the gum with cotton tightly compressed. This failed. A part of the root-canal was then tapped for a gold screw. The screw being turned firmly into place in the root, an oblong piece of stiff platinized gold plate, drilled at one end with a hole larger than the screw, was bent into a quarter-circle. This was so placed that the screw in the root passed through the hole in the plate, the plate curving upward toward the palate so as to cover that portion of the gum to be forced away from the broken root. A bit of cotton, firmly compressed, was placed upon the gum under the curved plate, and a gold nut, put upon the screw, was turned firmly down upon the plate, forcing it and the cotton upon the gum.

FIG. 5.



This apparatus, shown in Fig. 5, worked powerfully, but the mass of tissue was too great to be thus disposed of, and after a few days inflammation supervened which threatened to result in pericementitis. It now seemed necessary to remove the troublesome tissue by excision, and, being debarred from the use of general anesthesia, cocaine was freely applied and as much as possible of the gum and cartilaginous tissues of the palate removed; gum-cutting pliers, gum lancet, and curved scissors being used. It was useless, for no clamp or gum-retractor could carry the rubber-dam deeply enough into the alveolus to surround the fractured surface and keep it dry. Each manipulation of the parts increased their angry condition. At this point two alternatives were presented, the first of which was to extract the root, fasten on the crown, and replant the tooth. The objections to this plan were the pain of extraction and replantation, and the recognized fact that a certain large percentage of replanted teeth ultimately fail. The other alternative was *to draw the root partly out of the alveolus, adjust the crown upon it, and push it back again.* If one tooth can be drawn down and another tooth can be pushed up, why could not both of these operations be combined? By this reciprocating tooth-movement, presumably painless, the fracture might be treated without severing the vital connection of the root with the alveolus. The objections to this operation were the fact that, so far as known, it had never before been done; the time necessary for the double movement of the tooth, and, finally, the inadequate fastening for appliances furnished by the other teeth.

The patient was not yet eleven years of age, and all the teeth were very short. The three other incisors were immature; the deciduous cuspids had been lost since the beginning of treatment, while the molars afforded but the slightest fastening. Having decided upon the new operation, a stronger screw was fastened securely in the canal and a rubber plate made to cover the molars and cutting-edges of the three incisors. This plate was thickened over the molars in order to keep the jaws slightly open. A broad, stiff spring, made of platinized gold plate, was screwed fast to the lingual surface of the rubber plate, extending forward between the left central and right lateral incisors. The free end of this spring was bifurcated, so that when in place the screw in the root would pass through the bifurcation. The construction of this plate is shown in Fig. 6, and a key by which the nut was turned in Fig. 7.

FIG. 6.

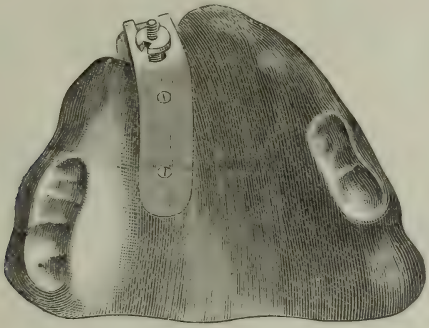
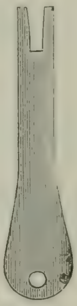


FIG. 7.



Had the cuspids been in place, a delicate gold fixture could have been attached to all of the oral teeth as a basis; but with so few teeth *in situ*, this rather clumsy apparatus seemed at the time the most practicable. With this plate, traction upon the root began on the 3d of April, from which date should be estimated the time required for the double movement of the tooth. The screw used had about sixty threads to the inch, and instructions were given to turn the nut closely up after each meal. The necessity of removing and cleansing the plate made it impossible to advance the nut with mathematical uniformity, since it had to be loosened before removing the plate, which was first pushed backward when taken from the mouth in order that the bifurcated gold spring might be disengaged from the screw without the entire removal of the nut. At first the root made no response to the force applied; but after a few days it began to move slowly downward, and soon more rapid progress was made. Then several interesting things were observed; for a time the gum clung closely to the root, advancing with it until the gingival border was almost even with the cutting-edge of the left incisor. Then the gum began to pull away from the root, and, little by little, the overstretched fibers of the pericementum parted and the edge of the gum drew back as if to resume its normal shape. This festoon of the gum, however, never wholly recovered its former position while the root was down, as may be seen in Fig. 8. The denuded surface of the cementum was light brown in color, and covered with torn fibers of the pericementum. During the latter part of the downward movement the gum was slightly everted from the root; there was no hemorrhage, and absolutely no pain. I do not mean to say that the whole manipulation of the root was painless, but that repeated questioning of the patient disclosed the fact that the downward movement was entirely painless. Owing to insufficient fastening afforded by the short molars, there was some movement of the plate during mastication, and as it was fastened to the root by the screw there was at times some oscillation of the root, resulting on several occasions in slight pericementitis. This was quickly reduced by removing the plate and substituting a splint of thin gutta-percha, softened in hot water, molded on the teeth, and secured in place by the nut and screw, and by tincture iodine and aconite applied to the gum. In a day or two the tissues invariably recovered their tone and the root resumed its downward course. During these periods of congestion some tenderness upon pressure upon the root, some reddening and slight swelling of the margin of the gum appeared, but no pain was experienced at any time due to longitudinal movement of the root. At one time the experiment was tried of placing a rubber ring for a day or two about the root in order to expedite the retraction of the gum, but with no marked effect. On the 24th of April, twenty-one days after the first application of force, the root was drawn so far out of its socket that the broken edge was nearly even with the cutting-edge of the adjoining central incisor, as shown in Fig. 8, having moved nearly one-third of an inch in three weeks. As the whole of the fractured surface on the lingual aspect of the root was, however, not yet within easy reach, force was again applied, and after some delays the lingual surface of the root presented, on the 7th of May, the appearance shown in Fig. 9, where the deep edge of the fracture may be distinctly seen. I have been thus particular to give the exact time required for this movement, since, as stated by Farrar on page 168,

FIG. 8.

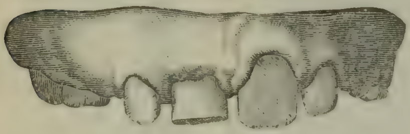
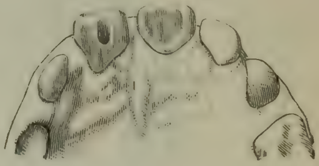
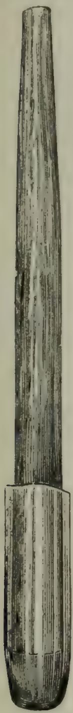


FIG. 9.



Vol. I, of his work on "Irregularities of the Teeth," there is some difficulty in securing full and accurate records as to the speed with which longitudinal movements may be effected. It was surprising how well the mouth looked with the broken tooth in its new position, and few persons in conversation with the patient would have noticed anything amiss if it had been slightly altered in shape. And in many cases of fracture the best course would doubtless be to draw down the tooth, protect the broken surface with a filling, and leave it so.

FIG. 10.



In this case, however, nothing less was desired than the perfect restoration of the natural tooth. Several days' rest, with a gutta-percha splint, rendered the root sufficiently firm for the adjustment of the natural crown which had been broken off nearly three months before. The crown, in the mean time, had been kept moist. At first it was immersed in alcohol and water, but fearing lest too long exposure to this mixture might, as I had observed in other instances where the tooth was that of a child, cause the breaking up of the crown, it was placed, early in March, in glycerin and water, and later in pure glycerin. In this bath both color and texture were perfectly preserved. When the time arrived to fasten the crown in place, it was soaked for half an hour in tepid water, which removed all traces of glycerin. The fractured surfaces of root and crown were then washed with pure alcohol, which cleansed the root and by evaporation rendered both perfectly dry. When attaching a crown, delay and difficulty are sometimes experienced in filling the root-canal with cement before crystallization begins, and as it was desirable to insure success in this instance at the first attempt, the little syringe shown in Fig. 10 was invented. It was easily made in a few minutes from a piece of glass tubing and a pine stick. The glass tube was filled at the large end with thinly-mixed cement, which was immediately injected into the root, the small end of the syringe being held at the orifice of the canal, which was thoroughly filled with one movement of the piston. The fractured surfaces were covered with a thin film of cement, the crown pressed firmly into place, all moisture excluded by rubber-dam held by a clamp for an hour and a quarter, and the mended tooth was tightly wrapped with a silk ligature for a day or two to prevent displacement. The appearance of the mended incisor is shown in

FIG. 11.

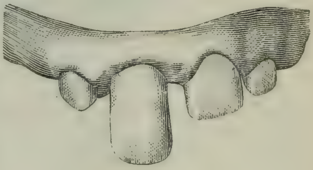
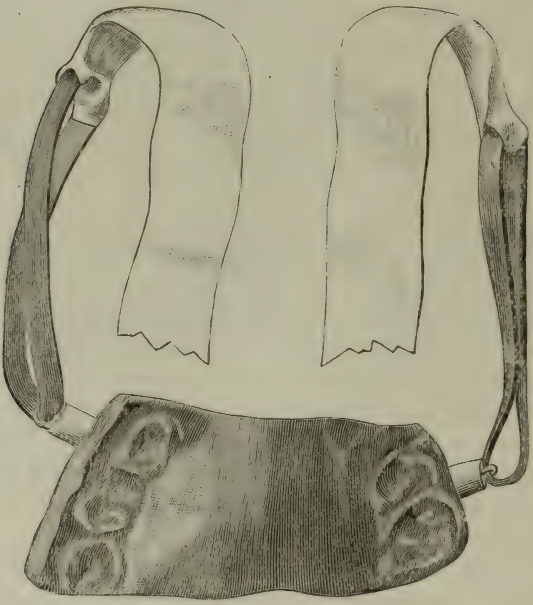


Fig. 11, and, as remarked by a friend of the patient, it was truly a "prominent tooth!"*

It was now necessary to protect the tooth from contact with the lower incisors, for the diameter of the root where they touched it was much greater than the corresponding thickness of the upper left central. To keep the jaws asunder, therefore, an old upper plate which had been made for this case but discarded was now hastily cut down so as to cover the upper molars only, and as it was impossible to make it hold fast, two gold screw-eyes—convenient things to have at hand—were inserted into it, one near each angle of the mouth. The angles of the mouth were protected from abrasion by a bit of rubber tubing slipped upon the shank of each screw-eye; an elastic ring was put in the eye of each screw, and a ribbon fastened to each elastic; these two ribbons, tied at the occiput, held the plate in position. This plate is shown in Fig. 12. As soon as practicable this fixture, somewhat uncomfortable during mastication, was replaced by a lower plate, covering the molars, passing across the lingual surfaces of the lower oral teeth and reinforced by a half-round wire of platinized gold passing

FIG. 12.



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*In making plaster casts of very long teeth, a slip of hickory-wood or bamboo placed in the impression of the tooth before the plaster is poured will prevent the breaking of the tooth when it is withdrawn from the impression.

across the labial surfaces of the incisors and cuspids. The upper surface of this plate articulated with the upper molars, rendering mastication comfortable. This plate is shown in Fig. 13. The next problem in the case was to devise some appliance sufficiently powerful to force this conspicuously elongated tooth back again into its place. It was useless to rely on any fixture attached to the molars; they were even too short to support any appliance controlled by an occipital bandage. An occipital bandage attached to the tooth alone seemed to me crude and ungovernable, and likely to result in injury to the tooth by displacement or irregularity and lack of delicacy in its action. Dr. Herbst's method of securing an implanted tooth by a strip of rubber-dam covering the crown of the tooth in question, perforated and slipped over the adjoining teeth and tied to their cervices, occurred to me; but these incisors had no cervices, and were too short to afford any such fastening. In this dilemma I concluded to make gold caps fitting the three unbroken incisors and cement them fast to the teeth, having first connected the three caps by gold wires passing across in front and back of the mended tooth, leaving an intervening space around it. Upon each of these wires were soldered three little gold buttons, as shown in Fig. 14.

FIG. 13.

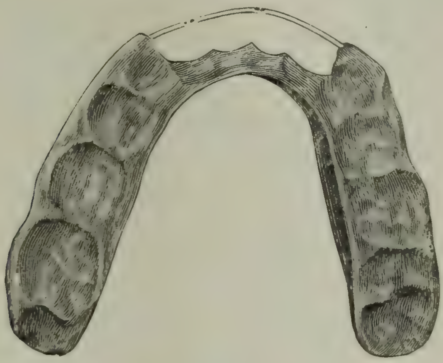
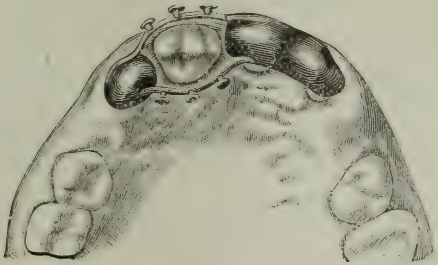
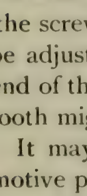


FIG. 14.



Here I wish to describe a ready method of making such fixtures. Having taking an impression of the teeth in modelling composition, and hardened it in cold water, it was dried, and that part representing the four incisors and the surrounding gum was filled with good, quick-setting amalgam, with sufficient edge-strength, mixed rather soft, and packed tightly into the impression. After the amalgam had hardened, the composition was removed with hot water, leaving a perfect fac-simile of the teeth in metal. This amalgam cast was mounted for convenience on a block of the composition, or a standard may be made of plaster. Upon this metal die thin gold plate of high grade was shaped with burnishers to fit the parts of the teeth which the caps were to cover. The seams were afterward soldered, and the connecting wires also soldered fast. This convenient method opens a novel use for amalgam; for economy the same amalgam might be used repeatedly. I have also made casts for similar purposes, of zinc phosphate cement, mixed thickly and packed into an impression slightly oiled. When the gold fixture was ready, rubber-dam was applied to the incisors, the surfaces of enamel and gold thoroughly cleansed with alcohol, and the caps attached to the teeth with Justi's insoluble cement, being held firmly in position by hand for three-quarters of an hour. It was to be a severe test of the virtues of cement, and no half-measures would do. After allowing a few hours for the cement to harden, the patient returned and a strap of elastic rubber was made with three small holes punched in each end. These holes were slipped over the buttons at the front and back of the tooth, so that the elasticity of the rubber might force the tooth into place. The stretching of the rubber at the button-holes, however, made the appliance unsatisfactory, and several modifications resulted finally in the powerful combination of rubber strap and screw shown in Fig. 15. At one end of the rubber strap are three gold rings, to pass over the three buttons at the lingual surface of the tooth. At the other end of the strap is a single ring to pass over one of the buttons at the labial surface of the tooth. To this ring is soldered a screw, passing through a gold tube soldered at right angles to a flat bar, which is sewed fast to the rubber. By means of a nut turned upon the screw with a watch-key, the pressure of the elastic strap could be adjusted to the most minute degree. By passing the ring at the end of the screw over the right, left, or middle button at the front, the tooth might be pressed straight up, or directed to the right or left.

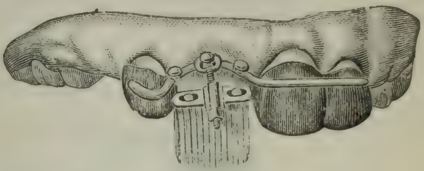
Fig. 15.



It may be thought that a screw alone would have been a better motive power, but a screw firmly attached at both ends, inelastic and inexorable, would have doubtless soon broken the brittle cement and torn the appliance from the teeth. By this combination, however, pressure could be regulated at will, made powerful but not unyielding, continuous or intermitting as required.

The strap could be readily removed for cleansing and replaced in a moment, and by means of the key the nut could be turned as directed at the patient's home. The operation of this appliance is shown in Fig. 16.

FIG. 16.



On the 12th of May pressure was begun, but in the twenty-four hours between the release of the tooth from the splint and the first application of force a perceptible, spontaneous retraction into the alveolus took place, caused doubtless by the elasticity of the pericementum.

The action of the band and screw was perfect, pushing the tooth gently but powerfully upward. The nut was not turned uniformly each day, but was so regulated as to give the strongest pressure compatible with entire absence of pain, alternating with complete rest. As the root entered more and more deeply into the alveolus, the thickening and eversion of the border of the gum disappeared. The festoon of gum which had been dragged down returned almost to its normal shape, and whatever irritation had been present subsided. Now arose an interesting and delicate problem. The patient was not yet eleven years old, and the unbroken central incisor not yet fully erupted. If the mended tooth were now pressed up so as to be of even length with its mate, the left central, how would it be when that tooth should attain its full growth? Would the pulpless tooth also grow and keep pace with its fellow, or would it remain where placed, and a constantly increasing deformity—central incisors of unequal length—be the ultimate result? On the other hand, if it were now left longer than its companion, would there not be risk of injury from accident or use? At this juncture I examined the incisors of both parents, and deciding what would be the probable length of the unbroken central incisor when fully grown, determined thus of what length to leave the mended tooth, assuming that it had lost the power of growth, and would remain where placed. It may be thought that the cervical edge of the enamel might have been discovered before the tooth was pressed back into the alveolus, and that the future length of the tooth might have been determined thereby. This guide was sought, but no sharp line of demarkation between enamel and cementum could be found. When, therefore, the mended tooth was so far pressed into place that its length equaled the supposed future length of its mate, pressure was discontinued. This was on the 4th of June, twenty-three days after the beginning of the return movement. This movement had been absolutely painless. Four days' rest was given the tooth, and the gold fixture was then removed. This was attended with considerable difficulty; and so well did the system of caps adhere that it was only after cutting them apart with file and drill that they could be separately removed. The four incisors then appeared as shown in Fig. 17. The tooth was now firm enough to admit of the following manipulation. In order to strengthen the fastening of the broken crown, a piece of screw-cut gold wire, like that used for the retention of fillings, was inserted through the sulcus on the lingual surface and into the root, in all a distance of more than a quarter of an inch, in such a direction that this screw and the gold post in the root would converge. The hole was drilled and tapped to fit the screw closely, the surplus wire cut off, ground down to the enamel, and the end covered with cement, to be replaced with a gold filling. This screw, as well as the post, is shown in Fig. 18. A gold collar might have done as well as the screw, but it would have disfigured the tooth, if in sight, and if pushed up under the gum would have broken up its union with the root. A temporary splint was now placed upon the four incisors to protect the mended tooth from violence, and a new problem was presented, namely: the construction of some device which would steady the tooth for a time without retarding the growth of the contiguous teeth. For this purpose a narrow band of gold was made to fit the mended tooth a little way from the cutting-edge, and on this band, at either side of the tooth and parallel with its axis, was soldered a small gold tube. Similar bands were made for the two adjacent teeth, but in place of tubes a small gold wire was soldered to each of the last-named bands, in such position that when one of the wires was passed into each of the tubes the three bands were thereby united in such relation to each other that they would fit upon the three incisors. The wires were oiled so as to exclude cement from the tubes, and the bands were simultaneously cemented fast upon the teeth. This appliance would hold the mended tooth, and brace it to resist any unusual force; for

FIG. 17.

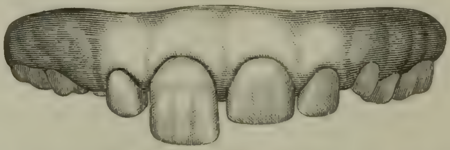
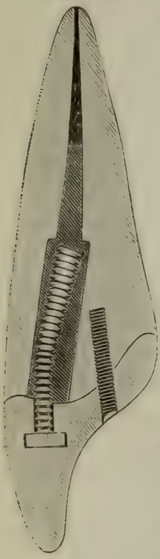


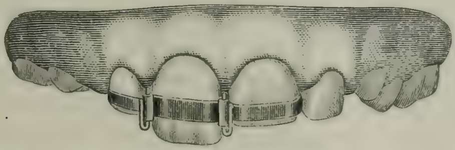
FIG. 18.



a sufficient time it would also hold it up in the alveolus. As the growing incisors on either side increased in length, they would simply draw down the wires in the tubes, but would still give lateral support to the tooth. This retainer is shown in Fig. 19.

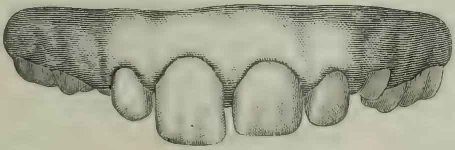
On the 11th of September these retaining-bands were taken off, the tooth being fixed and immovable, the gum firm and healthy. On the 24th of September the teeth appeared as shown in Fig. 20; the difference in length of the two central incisors being already much less than it was on the 9th of June, when the impression was taken for Fig. 17, and I presume this difference will gradually decrease until it disappears. The color of the crown is perfect; the cervix is a shade darker, either from some retrograde change in the tissues during the long period of treatment, or from the opacity of the cement in the root. There is a little roughness at one end of the joint where the apposition of the parts is not quite perfect, but as a whole the tooth is useful, sightly, and satisfactory.

FIG. 19.



The treatment of this case was largely upon new ground, requiring invention and experiment, and, hence, necessarily tedious and slow. In such protracted operations for children, if we are considerate for our little patients and gentle with them, we shall often be rewarded by an exhibition of the sweetness and patience of childhood that will excite our wonder and admiration.

FIG. 20.



Is it worth while to undertake such difficult and costly operations for the preservation of a single tooth? That question must be considered in each instance. There can be no general rule laid down, because teeth have no fixed and uniform value. For one patient a few dollars at the most would represent the value of a tooth, and such elaborate treatment would be a thankless undertaking. In other cases, as in this, the frail fragment of enamel is far more precious than the purest diamond, and every effort for its restoration meets with full appreciation and generous reward. In the practice of our profession, who would miss the joy of invention and triumph over difficulty? Few obstacles are really insuperable, few cases are absolutely desperate if we will but give to them persistent study and refuse to be discouraged.

EROSION.

BY C. EDMUND KELLS, JR., D.D.S., NEW ORLEANS, LA.

(Read before the First District Dental Society of the State of New York, October 13, 1891.)

MR. PRESIDENT AND GENTLEMEN: In this disease the cases that have been observed and studied by me have all presented the same general characteristics which have been fully described by writers with whom you are so familiar that it would be but a waste of time to detail here the various appearances of eroded teeth.

Passing, then, the conditions as presented by the teeth attacked by this mysterious process, we will devote ourselves to a consideration of its causes and the measures to be taken for its cure or arrest.

Mysterious process I have called it, and well I may, when we consider that writers of authority are not yet agreed upon its cause, and radical measures of relief have to my knowledge until the present writing not been suggested.

The following are the conclusions reached by some of the best-known writers upon the subject. Dr. Black says,—

"The theory that it is caused by acid mucus is supported by several who have written upon the subject, and our present knowledge affords no alternative but the acceptance of the general idea that it is the action of an acid under some peculiar modifying influences as yet unknown to us."

In 1886, Dr. Kirk, in a very elaborate article before this society, stated his belief that "erosion is caused by the solvent action of the acid secretions of certain mucous follicles in the buccal mucous membrane."

In 1890, Dr. Garretson, in the latest edition of his great work, devotes but a page to this subject, which must have been a great disappointment to those most interested. He appears undecided in the matter, with an inclination to attribute it to electrolytic action.

Dr. Bonwill has a number of followers who persevere in the belief that it is caused by friction alone, notwithstanding the fact that they must then admit that *transverse* friction can produce *vertical* wasting, and *vice versa*.

Taking up these theories for consideration in the inverse order in which they have been given, we will first dispose of Dr. Bonwill's with the mere statement that it does appear inconceivable how any thoughtful man can reach such conclusions.

To a person at a total loss for a cause of erosion and unfamiliar with electrolytic phenomena, and at the same time desirous of attributing the disease to something, we can readily conceive how he can gladly turn to this subtle agent and convince himself, perhaps aided by extra oral demonstrations which he imagines cover the ground, but which, in fact, are far from doing so, that he has discovered the real and true cause in *electric action*. But the careful observer of cases of erosion as they present in their various widely differing aspects cannot be convinced that such results can be produced by electrolysis, if he has a thorough understanding of that action of the electric current.

Next in turn we reach Dr. Kirk's conclusions. He says, "Erosion is caused by the solvent action of the acid secretions of certain mucous follicles in the buccal mucous membrane." And this theory has been adopted, I believe, by Dr. Ottolengui.

To substantiate it, careful tests were made by them with litmus paper, and the result showed the secretions of the glands in question to be distinctly acid. But no reason for the limiting of the eroded spots to such definite areas was assigned. Now, if the teeth were only attacked upon their buccal and labial aspects, with which surfaces these acid secretions would come in contact, this theory would no doubt have long since been generally accepted as conclusive. But how are we to reconcile to it the fact that the lingual surfaces of the incisors will show marked signs of the disease?

The grinding-surfaces of the molars are frequently singled out, and markedly affected by this process. In such cases there is great loss of tissue from these surfaces, while none of the other teeth are involved. Therefore we must admit that while Dr. Kirk's theory will apply beautifully to some cases, it fails entirely in others, and therefore we must look further for one that will be universally applicable.

Lastly we reach Dr. Black's theory, that "it is the action of an acid under some peculiar modifying influences as yet unknown to us." To substantiate his theory he made some beautiful and convincing experiments by which he succeeded in producing artificial erosion in teeth out of the mouth. His admission that the peculiar modifying circumstances are yet unknown, leaves his theory incomplete and therefore not acceptable.

These are the theories. As to the remedies, but little has been suggested other than filling. But that is merely a replacing of the lost tissue, which in no light can be considered as either a remedial or preventive agent, and, therefore, will be treated of only in the concluding part of this paper.

As just stated, the etiology of erosion appears to have received much more attention than its therapeusis. Dr. Kirk, however, believing that the acid is secreted by buccal glands, suggested the use of prepared chalk upon the gingival margins of the teeth. Dr. Ottolengui, in addition to this, when possible, cauterizes the glands with lunar caustic.

Often, however, this latter is impossible, and I fail to perceive how any benefit can be expected from the application of chalk to the cervical margin of a tooth, when the erosion is not anywhere near that point. In fact, I will state right here, that in cases where this treatment was faithfully carried out by me for months no beneficial results were obtained.

I have presented the status of this disease as it stands to-night, and my reasons for not accepting any of the theories so far advanced in regard to it.

I shall continue the subject by advancing to you a theory that appears to me applicable to all phases of this disease, and suggesting radical measures for its cure, or, when that is impossible, means of preventing its further ravages. If these meet with your approval, my labors will have been rewarded; if not so, let us hope that the ideas here advanced will at least stimulate some of my hearers to investigation of the subject that will in the end result in the success for which I have, at least, striven.

I would first call to your minds the peculiar clinical aspects of the disease. We are at once forcibly impressed with the fact that in each case certain portions of the teeth are selected for invasion; and as different patients present, we are gradually convinced that there is no surface of any tooth that is not susceptible to its inroads.

Knowing what we do of the vulnerability of the enamel when attacked by acids, and with such knowledge corroborated by Dr. Black's experiments before alluded to, how can we deem it necessary to seek further than the mucous membranes of the oral cavity for the destructive agent?

For careful tests will disclose more or less acidity of the buccal or oral secretions in all cases of erosion, and it therefore remains to discover the *peculiar modifying circumstances* which so greatly limit its action, and which, as Dr. Black says, are "unknown to us." For without these "peculiar modifying circumstances" we should find the surfaces eroded more evenly than we do.

For a long time I wanted to believe that the erosion as presented in the well-known forms of the disease, when a portion only of the labial surfaces of but few of the incisors were involved, was caused by acid-mucus secretions of disordered glands in the buccal mucous membrane which lay continually upon the doomed surfaces. But I was unable to satisfactorily explain how such an eroding agent could confine its destructive power to such a limited area. But, finally, a long and continued study of these cases has led me to believe that earnest reflection upon the attending circumstances should lead to no other expectations than this self-same limited area of invasion. For do we not always find that the erosion has progressed to a greater depth in the central or nearly central portion of the invaded territory?

Here, then, is the direct point of contact with the duct of the mucous gland, and its acid secretion being in its most concentrated state, is most active. As the fluid spreads out upon the surface of the tooth, it meets and mixes with the adjacent normal and alkaline fluids, and as it becomes gradually neutralized, acts more feebly until, being entirely overcome by the more harmless fluids, it ceases its destructive process.

I can think of no better illustration to compare its action to than what occurs when a pebble is dropped into a still pool of water. Where the pebble strikes, there is the center of disturbance, and the activity is the greatest. As the ripples widen and widen, they grow fainter and fainter, until at last there is no longer force enough to overcome the resistance met with, and they die away completely.

This, then, is the theory which I advance to account for the limiting of the destructive power of the secretion of certain disordered mucous glands by the alkaline fluids of their more healthy neighbors.

But this does not apply to cases where the erosion takes place upon other than buccal surfaces. A clinical study will reveal the fact that while in the class of cases just discussed very careful tests were required to reveal the acidity of the secretion of the mucous glands (its quantity being so minute), in the class now under consideration it is easily discovered that the saliva, as a whole, is distinctly acid.

That being the case, should we not look for the erosion of the entire surfaces which are exposed alike to its action? But that does not occur; in fact, distinct acid saliva may present, and no trace of erosion be exhibited. However, under just such conditions,—that is, the general acidity of the saliva,—typical erosion may be found, and it only remains for us to discover its cause.

Given, then, all the teeth, bathed alike in an acid fluid and erosion appearing upon limited parts of certain teeth only, is it not reasonable to assume that the portions attacked are inherently more susceptible to its solvent action than the parts that escape? Such a conclusion I have reached, and it has been substantiated by operations upon such teeth themselves. In their preparation for filling, the variation from normal structure can be plainly perceived. Such a tooth seems to have lost its integrity or tone, and cuts almost like horn. This alteration in tooth-structure is certainly not to be accounted remarkable, as we are aware that the teeth are subject to numerous pathological changes, as are any other organs in the body.

By actual demonstration I have been convinced first, that, where erosion of the buccal or labial surfaces of the teeth occurs, careful test will prove the secretion of an acid mucus by disordered glands situated in the mucous membrane that lies normally in contact with them, although the reaction of the saliva as a whole is distinctly alkaline; and second, where erosion occurs upon the surfaces of the teeth which are not normally in contact with the mucous tissues, the reaction of the saliva as a whole is constantly or at times of an acid nature.

From these demonstrations it has been concluded that erosion is caused by, first, the dissolution of the tooth-structure by an acid agent which at times is secreted by disordered glands in direct juxtaposition, and whose destructive action is limited by surrounding alkaline fluids; and second, the dissolution of the tooth-structure by an acid agent held in solution in the saliva, which is not sufficiently powerful to attack normal enamel, but seeks out and destroys any surfaces which through inherent defects are weak enough to yield to its influence.

Having, then, formulated a theory upon the cause of the disease, the next step is to seek measures of relief.

As before mentioned, the use of prepared chalk and cauterizing the glands have been suggested. As to the former, it will, I fear, hardly rank as a valuable treatment. Did the acid mucus ooze from the gingival margins only where the chalk will adhere, we might expect it to prove efficacious. But coming from an opposite direction and attacking often a comparatively remote portion of the tooth, I do not understand how beneficial effects can have been attributed to its use. Cauterizing the glands when possible with lunar caustic I would consider but temporizing, for, by its well-known self-limiting action, the entire destruction of the glands cannot result.

Having subdivided the cause of erosion, I would classify the treatment as follows:

First, where the disease is limited to a very few anterior teeth, and exhibited upon their buccal and labial surfaces only, it may be taken for granted that the disease is in its incipiency, and but few glands have become disordered. It being possible to discover them by their abnormal or engorged appearance, would it not be practicable to entirely destroy and eradicate them, and so having eliminated the source of the disease stop further progress and extension?

When a dermatologist punctures a hair-follicle with an electric needle, and by the aid of the galvanic current "electrocutes" it, thus ending its functional life, I can see no reason why we should not bring the same methods to our aid, and thereby exterminate these little erring glands; and secondly, where the erosion is caused by distinct acidity of the saliva, efforts should be made by constitutional treatment to overcome this diseased condition and restore it to its normal state.

Under all conditions lime-water should be used as a mouth-wash, frequently and in quantities. I would here note that I prescribe prepared chalk to be packed around the necks of the teeth at night, and morning after breakfast, when possible, and also between teeth containing large approximal fillings, but with the object of preventing caries more than erosion.

I have with me the models of a case in which the disease is very extensive, having attacked the labial surfaces of the ten upper and ten lower teeth. Here I believe the trouble to lie directly in the mucous glands of the lips, and, from the effects produced, they must be vast in number,—in fact, the whole surfaces are involved, and a cure by electrocutionary measures is out of the question.

However, that radical procedure had not occurred to me, when, having concluded that the acid mucus from the labial glands was causing the wasting, I decided that if I could not prevent its secretion I could certainly stop to a very great extent its destructive action. To obtain this result a rubber splint was made to cover the entire labial and grinding surfaces, and cutting-edges of the teeth, and the patient directed to wear it at night. The entire dissipating surfaces being thus covered, contact with the glands and their acid secretions was prevented, and a cessation of the erosion was expected. This was to be worn at night, primarily because it is conceded by most observers that the destruction must be greater during the hours of repose, and secondarily because to wear it during business hours would be impracticable. This was made for the upper teeth just a year ago, since which time the case has been under constant surveillance.

The result is that the progress of the disease has been practically stopped upon the teeth so protected, while the lower teeth continue to suffer. As a consequence, I have recently made a protecting splint for the lower ones also.

Just at this juncture let us stop to consider a point which no doubt has risen in your minds, and without a consideration of which this paper would be incomplete.

It has been suggested that erosion was caused by electrolytic action, and that the rapid disintegration of tooth-structure around a gold filling inserted in an eroded tooth was due to electric currents generated by the metal in contact with the tooth.

In filling such a tooth, merely the wasted tissue was replaced by gold, and no measures were taken to prevent the acid mucus from spreading over the polished metal and attacking the encircling margins. Why need we attribute the continued destruction of the tissue to electric currents established between the gold and tooth-substance, when precisely the same action took place prior to the insertion of the gold?

Erosion does not occur around a metallic filling which was inserted in an ordinary carious tooth in which there was no previous sign of the disease. Were the filling of such a cavity followed by erosion, we might well say that the insertion of the metal did induce the formation of such destructive currents. This, however, not occurring, would certainly appear to disprove that theory. Again, theorize as we may, clinical experience is after all to be depended upon in establishing certain rules of practice. If there be one method of practice above all others that should appear to invite unfavorable results, is it not that of filling one cavity with two different metals, each of which is partly exposed at the surface of the filling? Here are all the details of a battery, and galvanic action, with its attendant decomposition of one of the elements, should follow.

I say *should*, but, contrary to all theories, it does not.

This is no idle assertion not based upon experience, for it has always been my practice in certain cases to fill a portion of the cavity with amalgam or tin, and the rest with gold; and such a filling that stands year after year, while other teeth in the same mouth are successively breaking down with caries, is to my mind sufficient proof that such a combination produces no deleterious electrical effect. So that to-day, with years of experience with such fillings, I firmly believe that a certain class of teeth can best be saved under that method of treatment.

From the foregoing the following may be succinctly summarized:

First. Erosion is caused by an abnormal acid agent, modified and controlled by recognizable surrounding influences.

Second. The disease may be cured by eradicating the disordered glands which secrete the acid, or by constitutional treatment which will restore the secretions to their normal state.

Third. When a cure is not possible, the effects of the disease may be prevented by suitably constructed splints.

Be these theories favorably or otherwise received, there is certain common ground upon which I am sure we can agree, and that is upon the necessity for the repair of the wasted organ.

That becomes necessary when the disease has progressed to a certain extent, although the exact stage in the wasting process when it may be deemed best to fill is a question upon which opinions may differ.

For my part it is my practice to spare my patients any operation that, by stretching a point, may be made to appear unnecessary. In the very earliest stages of erosion upon the buccal and labial surfaces, when nothing but a little saucer-shaped depression exists, it may be advisable to merely polish off the surrounding margins.

In another stage of the disease, the deeper portion of the tooth may have become so exposed and sensitive as to be a source of very great annoyance, if not pain, and requires protection by filling. In other cases nature is more considerate, and by her conservative processes the pulp protects itself, and sensation of the parts is almost nil. One case came under my observation when the invasion proceeded until the pulp itself was killed, and yet the exposed part had never given pain. Here, then, the better judgment of the operator would have called for protective measures, even though there was no sensitiveness manifested.

So it is with the filling-materials to be chosen. It requires judgment to select from the few at hand the one best adapted to any indicated case.

When there is only ordinary sensitiveness exhibited, gold, no doubt, is the most satisfactory, although porcelain inlays, when they can be used, may claim a share of the honor for first place.

But when the pulp has been somewhat encroached upon and sensitiveness results, a metal filling is not indicated, for its good thermal conducting qualities would doubtless result in the death of the pulp, or at least great discomfort to the patient. Here, then, the oxychloride of zinc may be temporarily inserted, which will induce the recession of the pulp and its attendant protective measures. The consequent disappearance of the excessive hyperesthesia will occur to such an extent that later it may be replaced by gold.

If in the progress of the disease the pulp is very nearly exposed, the oxychloride would doubtless cause its death. This may be prevented by flowing over the dangerous spot a thin cream of the oxide powder mixed with pure wood creasote. The oxychloride may then be used to complete the operation without fear of severe results. When the time arrives to refill such cavities with gold, it is always advisable, when the depth will allow, that some of the cement be left in the bottom of the cavity, and the gold placed over it.

While I cannot substantiate my assertion by any demonstrations, I must say that clinical experience has convinced me that in the results obtained the oxyphosphates do not equal the oxychlorides.

It is exceedingly perplexing to a careful observer how the same agents can produce, or at least are accredited with, the production of opposite results in different hands. Now, to me,—and I have tried it a hundred times if I have once, and always with the same results,—there is no material in use for filling which produces more disastrous results in a case of hyperesthesia than the gutta-percha products of the Hill's stopping order. I have never failed to see them increase the sensitiveness wonderfully, and yet I have seen their use advocated in cases of erosion.

Upon the effects of gutta-percha above mentioned arguments without end might follow with no satisfactory conclusion being reached, but upon a like question of even more interest, some light may be thrown.

We constantly meet in the journals and at meetings the statement that the oxychlorides and the oxyphosphates as filling-materials protect the sensitive dentine from thermal changes, as they are non-conductors of heat and cold.

With this statement you are all familiar, and for all I know such may be the opinion of some who are present to-night. Practical experience with these materials led me to believe the contrary, and finally I was able to demonstrate, not only that the oxyphosphates and the oxychlorides are good thermal conductors, but also, to a certain extent, to compare this property of various filling-materials with that of the natural tooth-enamel itself.

By the instrument used for the purpose, technically called a thermostat, I can more clearly illustrate the method of the tests. It is based upon the well-known property of the expansibility of metal under the influence of heat.

It consists of a slightly concavo-convex disk of zinc (used on account of its greater coefficient of expansion), which is rigidly confined at its periphery by being secured to a hard rubber or porcelain base. Directly in the center of the base projects a finely threaded screw which is capable of being adjusted to within a greater or less distance of the disk. Now, it is evident that when the disk is subjected to heat it cannot expand laterally, and so must bulge upwardly toward the screw, therefore the distance between the point of the screw and the disk, and the amount of heat applied to the latter, may be relatively adjusted so as to insure their contact at any predetermined degree of temperature.

If, now, this instrument is placed in circuit with an electric bell and battery with no contact of the screw and disk, there will be no sign, but the moment the circuit is closed by expansion of the disk to contact with the screw, the path for the current will be completed and the bell will ring.

The simplicity of this instrument is only equaled, I believe, by its phenomenal delicacy. In the one I now hold in my hand the disk and the screw are so adjusted that the warmth of my breath will swell the disk up to the point of contact, where it will speak for itself.

The method of testing the thermal conducting powers of various filling-materials, and comparing them in that respect to enamel, is as follows: The enamel of a sound molar was hollowed out into the shape of a cell. Similar cells of the same size were made of gold, tin, amalgam, oxyphosphate of zinc, oxychloride of zinc, red gutta-percha, and Hill's stopping.

In the apparatus before me the thermostat is connected, the cells of the materials to be tested are at hand, and warm water is ready for demonstrating their conductivity.

I will first place upon the disk the cell of gold, and filling it with the warm water, our ears at once corroborate what we already know as to its conductivity. For no sooner had the gold cell been filled with the water than it at once conducted the heat to the disk beneath.

Replacing this gold by tin and amalgam successively, the same results are produced.

The oxychlorides and the oxyphosphates will follow, when it is readily perceived that more time is required to heat the disk, thus demonstrating them to be poorer conducting agents than the metals, but far from being non-conductors.

We will next try gutta-percha and Hill's stopping, which prove themselves much poorer conductors ; but give them time, and the bell does ring.

Lastly, I place the enamel cell on for demonstration, with the result that sufficient heat to close the circuit is not transmitted to the disk.

From these experiments we may conclude that, contrary to the general opinion held, the oxyphosphates and the oxychlorides of zinc are relatively good conductors of thermal effects, and further, that for protecting the dental pulp nature has provided a shield that has not yet been successfully replaced by dental science.

METHODS OF REGULATING TEETH.

BY V. H. JACKSON, M.D., D.D.S., NEW YORK, N. Y.

(Read before the American Dental Association, Saratoga Springs, N. Y., August 6, 1891.)

SINCE reading before this association, in 1889, a paper on "Some Methods of Regulating Teeth," in which was described a system of using removable spring appliances, valuable methods have been developed, some of which will be described, with reference to models and apparatus, showing in detail the manner of constructing the appliances.

It is not the present intention to enter into a discussion of the reasons for advocating early regulating, as that is not the purpose of this paper, which leaves the question for consideration at another time.

It is, however, the opinion of the writer that each tooth should be encouraged to take a correct position in the circle of the arch while erupting (or as soon thereafter as practicable), in order to promote the proper development of the jaw, for the teeth next to be erupted are thus more likely to do so in proper position and order. Only a portion of the alveolar process that forms the sockets for the roots of the teeth is developed until the teeth are fully erupted. For this reason a slight pressure will change their position.

When convinced of the advisability of regulating teeth for young patients, several devices have been adopted with partial satisfaction, but none as yet have met all the requirements so perfectly as the "crib," which is equally applicable to patients of every age.

Impressions taken of irregular teeth for the purpose of making appliances are usually more satisfactory when taken with some of the modelling compounds, as the surface of the model will be much smoother than when taken in plaster, and the compound is more agreeable to the patient. It should be hardened as quickly as possible by the application of small napkins about two inches square, folded and moistened in ice-water.

The impression cup should be well shaped to the arch.

If the teeth are long and there is danger of the compound dragging while being removed, a quantity of pulverized soapstone should be sifted over the surface before inserting. If there are undercuts between or cavities in the teeth that are of such shape as to cause the compound to drag while removing, they should be carefully filled with wax or other material. If the second or third molar is inclined forward into the space formerly occupied by the first molar to such an extent as to prevent getting a perfect impression, it can be overcome by either placing a rounded piece of soft compound longitudinally between it and the tooth next in front, and allowing it to harden in such shape that there will be no undercuts, or by shaping a small piece to the gum and mesial surface of the inclining tooth to which it may be ligated. When well shaped and sufficiently hard, it should be covered with one or two layers of thin moist paper, and the impression taken either in plaster or modelling compound. The parts are then removed and placed together. If the operation is well performed, a perfect impression is the result. Water injected from a syringe under the lip when removing the impression will relieve the tendency to suction, and thus avoid the danger of drawing the compound up in the center, which so often spoils the impression. Forcing water under the lip with the syringe when removing plaster impressions is found to be invaluable, as it furnishes the moisture demanded by the hardening plaster and causes it to separate from the mucous membrane.

In taking an impression of a model to make a duplicate, dry heat is preferred for softening the compound. The model and compound should be well covered with soapstone as before described.

Since the first publication of this system of retaining plates and cribs,* it has been constantly employed with slight improvements in its adaptation and method of manipulation, and has been demonstrated at various clinics as a most complete system for moving teeth.

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*DENTAL COSMOS, Vol. XXIX, page 373.

The models are to be prepared by carving the plaster well away from the gum portion at the necks of teeth that are selected for anchorage, choosing usually the temporary molars, bicuspids, or permanent molars.

A piece of any metal suited to the purpose, and shaped like a partial clasp, is formed to either or both the lingual or labial surface of the teeth to be used as anchors, usually arranging the metal on the lingual side only, and choosing either very thin gold, block tin, rolled copper tinned, German silver, or tagger's tin. The latter works most easily, but is apt to corrode and should be often polished. After the metal is cut to proper form, it is contoured, which is an easy task, by using the contouring pliers made by The S. S. White Dental Manufacturing Co. for contouring gold crowns, with which pliers the metal may be hollowed to fit the contour of the tooth, it should be pressed well up about the neck, and at the same time made to curve over the grinding-surface between the teeth to prevent the appliance from pressing on the gum.

FIG. 1.

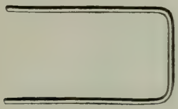


FIG. 2.

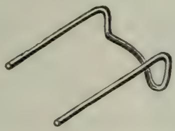
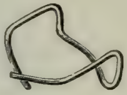


FIG. 3.

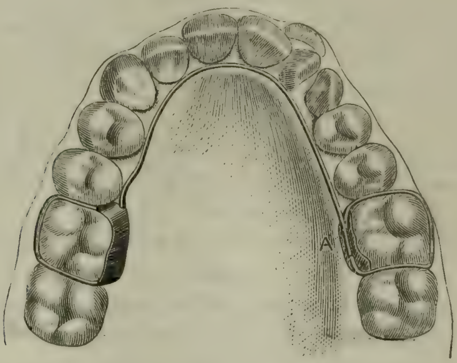


If adjoining teeth are to be used as anchors, the metals are arranged on each, and united at the junction of the teeth. A spring wire, about No. 20 or a little larger, as the case may require, is formed so that it will fit the labial side of the tooth, with both ends passing over the arch at the junction of the adjoining teeth, and curved about the lingual side near the gum line, to rest on the metal described; but should be made to fit loosely so as not to injure the plaster model when removing it. The wire is most easily formed by first bending it at right angles (Fig. 1), leaving the width between the parallel sides equal to the antero-posterior width of the tooth to be clasped. The part that is to clasp the neck of the tooth is then so curved with clasp-benders that it will be perfectly adapted to the curve of the labial side of the tooth (Fig. 2). Both wires are then placed in the clasp-bender at proper distance from the curved portion, and bent nearly to a right angle to cause them to pass over the grinding-surface, and again bent in the same manner to extend toward the neck of the tooth on the lingual side (Fig. 3). The ends are then bent toward each other near the gum line over the metal previously described, as seen at A, in Fig. 4. If the appliance is to be attached to the teeth of the opposite side of the arch, the crib should be constructed in the same manner on that side. A base wire, which is usually of a larger size, is then formed to the lingual side of the intermediate teeth, with its ends passing over the metal described, on either side of the arch.

The wire is held in position on the model and is soldered with the clasp spring to the metal described, by laying on them a piece of soft solder or tin sufficiently large to finish the soldering at once. The parts are then fluxed with chloride of zinc, and fused with a hot soldering iron. When using steel spring wire, the chloride of zinc should not be used until the soldering iron is ready for soldering, as it corrodes the steel in a few moments sufficiently to interfere with the union.

The preceding process simplifies the previously published method of making nearly all the crib of one piece of metal, which often proves difficult; this permits it to be made in sections, that are adapted to the different parts of the model perfectly, and are then united while in position, which insures a perfect adaptation if the model has not been injured by handling. An additional spring can be added at any time.

FIG. 4.



A narrow strip of tinned copper or tagger's tin is used in preference to the binding wire formerly described for winding the joints in uniting springs, etc. The strip is wound about the parts in the same manner as the binding wire, and the solder flows over it more freely. Copper wire gauze and perforated tin have been used to advantage.

About three years ago it was observed that when copper was used in small quantity, as binding wire and other forms in appliances that were retained for long periods of time in contact with the teeth for regulating and retaining them, there appeared to be no consequent injury in the way of structural tooth-changes or decomposition of food-particles underneath the fixture. The subsequently continuous use of copper has tended to prove its detersive properties in this connection.

At a public clinic recently, while the writer was relating the advantages of using copper for similar purposes in the mouth, Dr. Walter S. Elliott, of Sag Harbor, N. Y., came forward and exhibited a rubber plate that he was wearing, that had copper covering the portions of the rubber that came in contact with the natural teeth. The teeth had formerly been extremely sensitive, but he now suffers no inconvenience. No injurious effects have as yet in any case been experienced from its use.

The common and reckless extraction of temporary and permanent teeth to relieve crowding should be discouraged, and in preference, when necessary, an appliance be made for spreading either the superior or inferior arch.

If there is insufficient room for the free eruption of the permanent teeth, it is best to begin to expand the arch, if necessary, when the incisors are erupting, an operation easily accomplished by means of the crib appliances.

Correcting the position of irregular inferior incisors will often correct the position of irregular superior incisors, if undertaken while these are erupting, or soon afterward. If two or more teeth are to be clasped, the width between the parallel wires, as seen in Figs. 1 and 2, should permit them to rest on the distal and mesial coronal sides of the two respectively, with the portion between them conformed to either the labial or lingual sides of the two teeth.

If the metal is formed to the lingual side of the teeth and the wire is also arranged on the same side, the ends should extend over the coronal surfaces to the labial side, and each be formed into an independent clasp to encircle the separate teeth, or the wire can be arranged on the labial side as described, for attaching it to a single tooth.

Dr. W. H. Jackson, of Ann Arbor, Mich., recommends a crib spring wire attached to a plate, and passing over one or more teeth on either side of the arch for retaining obturators, and thus avoiding the ordinary injury to tooth-structure. (See *Journal of Dental Science*, Vol. XI, page 134.)

The advantage of using the crib appliance for young patients is that it is easily retained, causes no inconvenience, and does not interfere with articulation, even when used in the upper and lower arches at the same time.

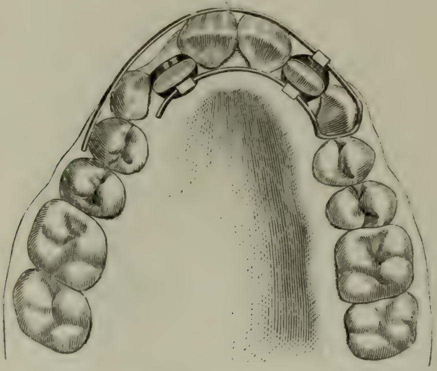
The model is not injured in making the appliance, and may be preserved as a record for future measurements and study.

By attaching the appliance to a single tooth on each side of the arch as an anchor, all of the other teeth tend to support it, and thus, in ordinary cases, the same object is gained as when more teeth are used as anchorages.

Where one or two incisors are erupted posterior to the natural position in the line of the arch, with, as is often the case, the first temporary molar, or bicuspid, decayed or absent, an appliance like Fig. 5 will, if the teeth are not too crowded, be sufficient to correct the irregularity. It is made of spring wire, about No. 17 to 20 standard wire gauge.

A loop is first made to pass through the space with one end following the lingual and the other the labial curve of the arch, and extending to or a little beyond the teeth to be moved. The spring on the labial side is usually made a little longer than the one on the lingual. The appliance is retained by placing a collar with a lug in suitable position on one or more teeth. If the power of the spring is found to be insufficient, a wire of larger size can be substituted, or a silk ligature be looped around each wire near its end, and by passing between the teeth cause additional pressure by drawing the springs together.

FIG. 5.



If all the teeth are erupted, and none are to be extracted, the appliance described can be made efficient by bending the loop at a right angle with the springs, and by suitably shaping it to lie over the arch at the junction of two teeth. This is easily accomplished by placing the loop in a flat-nosed plier or a vise and bending at once to the required angle, being careful to have the loop so shaped as not to interfere with the closing of the teeth, and to retain it with gold collars and lugs on the teeth as previously described.

If the arch is much crowded and some of the teeth too prominent or requiring to be rotated while at the same time expanding the arch, an appliance like Fig. 6 will often be required, and in addition to the appliance described a base wire should be anchored either to the second temporary molar, second bicuspid, or first permanent molar on each side of the arch, and provided with one or two loops or corrugations, just anterior to the crib attachments. The loop-shaped spring is then united to the base wire by one of the methods previously described. To expand the arch, the loops or corrugations in the base wire are opened slightly from time to time, and the loop in the spring over the incisors changed to meet the indications.

If the lower incisors are crowded, and especially if they are held back by the position of the superior incisors, and their position is such as to require the whole or part of the arch to be expanded, an appliance like the one shown will, in many cases, meet the requirements. The base wire in this instance is made with a loop in the center just posterior to the central incisors, and anchored to a tooth on either side of the arch as described. A spring is then attached to the base wire just anterior to the crib portion on each side in the usual manner, and extended forward to the lingual surface of the teeth to be moved. A collar with a lug is often placed on an incisor or other tooth to steady the spring. The pressure is controlled by opening the loop and bending the springs outward.

FIG. 6.

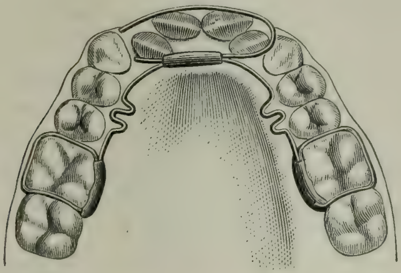


FIG. 7.

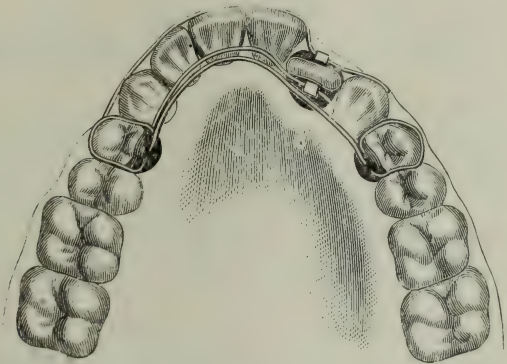


Fig. 7 exemplifies the method employed to force into line a left superior lateral incisor that was far inside of the arch and out of proper position. At the same time the arch was to be spread to some extent. A crib was formed about the first bicuspid on each side of the arch, and to the crib was soldered a base wire that was shaped to the curve of the lingual surface of the teeth. A spring was then fastened to the base wire near the right bicuspid and extended forward, forming a spring which passed beneath a lug soldered to a collar on the lateral. The same system was employed to move a central incisor out into line, the crib being attached to the temporary molar. In each case the teeth were moved into position in a very limited time.

It often occurs that all of the superior incisors bite over the inferior incisors excepting one (either a central or lateral). If the teeth are not crowded, and there is no necessity for expanding the arch, a collar having an eyelet or tube soldered to the labial surface can be placed about the tooth that is to be brought forward. A spring wire is then formed into a loop, the ends extending parallel, with one twice as long as the other and curved toward the shorter one, and also curved back sufficiently to follow the labial surface of the teeth in the arch (Fig. 8). The longer spring should at least be long enough to cross the surface of three teeth. The shorter arm is usually applied next to the gum, and is bent slightly outward before being placed in the eyelet or tube.

FIG. 8.

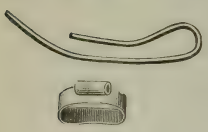
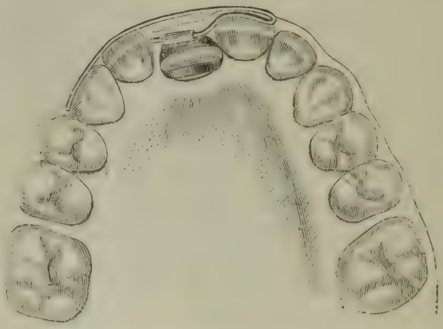


FIG. 9.



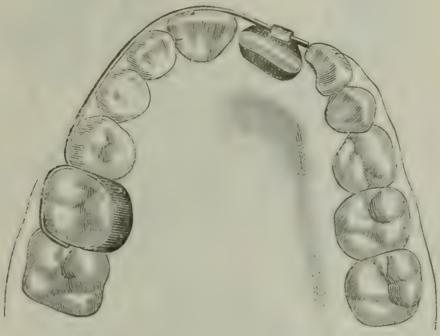
In adjusting the appliance the longer spring should be next to the gum, while the end of the shorter one is being inserted in the tube; then by turning it downward the whole appliance comes into proper position, with the shorter arm of the loop acting as a spring to draw the incisor outward (Fig. 9). The spring is removed easily to put on more pressure, and usually requires no other means of retaining than the tube on the collar.

In Fig. 10 it will be seen that the right superior incisor is too prominent and the left incisor not prominent enough, and is partially rotated. The irregularity was corrected by making a crib with which to clasp the second right superior temporary molar. A spring extended from the crib to the front of the arch, following the labial surface of the teeth near the gum line, and was formed to pass the right incisor and to extend into a tube soldered to a collar placed on the left incisor.

By removing the appliance and slightly straightening the end of the spring, pressure was exerted on the front of the right incisor, forcing it back into line, and acting at the same time as a lever it drew forward sufficiently to move the left incisor into line, and also to rotate it. The same method has been used with marked success for rotating teeth, making the crib portion either with the partial clasp soldered to the end of the spring, or with the end of the spring formed into a simple crib, to pass over a bicuspid or molar, with the other end of the spring portion extended into a tube or eyelet in the band about the tooth to be rotated, being careful to bend only the end of the spring where it enters the tube, when more pressure is required.

A very simple and effective method for rotating into proper alignment one or more central incisors that are fully or only partially erupted is to place a collar on one or both, with suitable lugs attached to hold a U-shaped spring wire, having one arm extending on the labial side of the teeth, and terminating in a curve so as to cause pressure on the mesial edge of the left central, and at the same time serve to keep the appliance from slipping laterally. The other arm on the lingual side is curved forward somewhat in the center, and its end left long enough to extend a little beyond the distal side of the left central. (Fig. 11.)

FIG. 10.



In the case illustrated the patient was but seven years old, and the temporary laterals were absent. But if the laterals are present the wire should have a loop so formed as to pass over the arch at the junction of the lateral and central incisors as described in Fig. 5.

If the incisors of the superior or inferior arch are inclined to the V shape, or the laterals are somewhat back of the normal line of the arch, and the rest of the teeth in proper position, a spring as shown in Fig. 12 will usually be sufficient to correct the irregularity. A spring is formed to extend across the labial side of the incisors to the distal side of the laterals, with its ends forming a loop and passing over the arch to the lingual side, and bent again at a right angle to follow the lingual side of the laterals and extend onto the outer third of each of the central incisors. It is usually retained by placing collars with lugs on the laterals.

It will readily be seen that by removing the spring, straightening the main portion slightly, and replacing it, there will be a pressure backward on the mesial portion of the centrals and a corresponding drawing forward of the laterals to rotate them and the centrals at the same time. Such appliances can be used for rotating the centrals alone in the same manner.

Fig. 11.

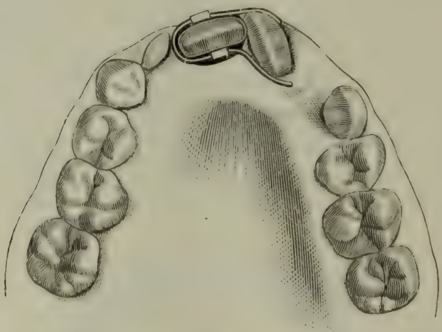


Fig. 12.

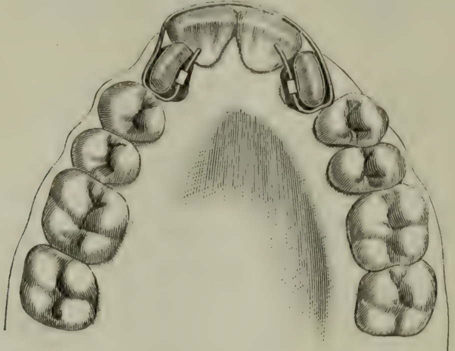
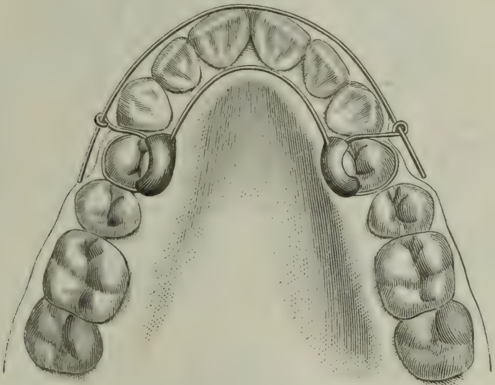


Fig. 13 shows a very convenient method of regulating the V-shaped arch, by forming a base wire (with or without a loop or corrugation), which is shaped to the lingual side of the teeth, and anchored to one or more teeth on either side by a crib, to the labial side of which should be attached a hook or eyelet to sustain a straight bar of spring wire that is sprung over the front of the teeth for the purpose of flattening the shape of the arch. The tendency of the wire to straighten itself exerts a pressure backward on the front teeth, and at the same time assists in spreading the arch.

Since describing in the DENTAL COSMOS* the method of drawing crowded incisors into proper line where a bicuspid had been removed on either side of the arch, a valuable addition has been made which facilitates the work. The foundation spring is made of heavy spring wire following the lingual curve of the arch, and attached by a crib to the teeth that are to be used as anchors, on the labial side of which are attached two independent springs on either side of the arch, one of which extends forward beyond the median line to act on the incisors ; the other, or shorter one, terminates in a curve on the mesial surface of the cuspid, which will so be drawn backward. If only one spring is used on either side, it will often be an advantage to extend the wires beyond the median line sufficiently to press on the cuspid of the opposite side of the arch.

FIG. 13.



Drawing into line one or more prominent bicuspids or cuspids, whether partially or fully erupted, where partial space remains for them, can often be effected by fitting thin metal to the labial surface of the teeth to be moved, and extending the metal well toward the necks and distal sides of the teeth. Then shape a good-sized spring wire to follow the outline of the front teeth, and extend that to the metal clasps to which it is soldered. The appliance is removed from time to time, and the clasping ends of the spring bent toward each other to exert the pressure required. (See Fig. 14.) A similar appliance was used for retaining the superior incisors and cuspids, that had been too prominent and were drawn back, the cuspids filling the space formerly occupied by the first bicuspids, which had been removed. In this instance a half-round gold spring wire extended from the labial surface of the front teeth back on either side of the arch and was anchored to the second bicuspid, the crib consisting of the partial clasp on the labial side and the spring wire on the lingual side of each respectively. The bicuspids had not moved forward perceptibly at the end of ten months, and the front teeth were perfectly retained.

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* Vol. XXXII, page 875.

It is obvious that an appliance for spreading the lower arch of teeth should not extend below the gum line, as the tissues are tender, and a covering plate is not tolerated without more or less rebellion, especially if the arch is to be expanded to any extent. Indeed, there is no apparent advantage in extending the appliance onto the mucous membrane in any ordinary case, as the alveolar process will follow and surround the teeth in almost any position they are made to assume. An appliance like Fig. 15 may be easily constructed and will meet all requirements. After carving the model and arranging partial clasps of metal on the palatal surfaces of the teeth on either side of the arch, a spring wire with a loop in the center is formed to follow the lingual sides of the teeth in contact with the metals. Tin or solder is then used for soldering, as in the more simple case. It is not often necessary to retain this appliance by extending wires over the arch.

Fig. 14.

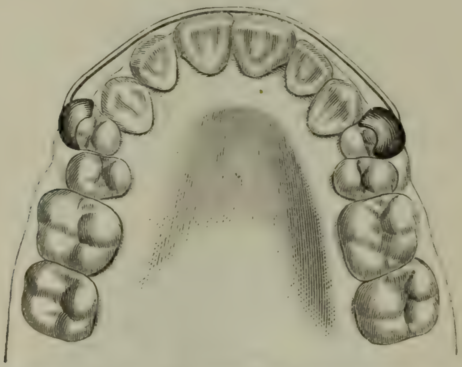
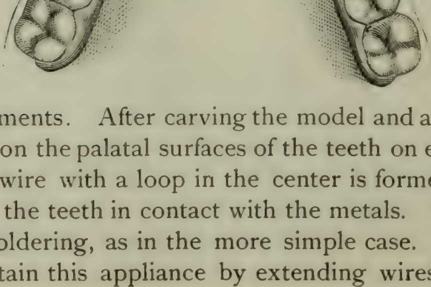


Fig. 15



The same system is applicable for contracting the arch, the moving force being developed by bending the spring inward or outward as the case may be.

The same system has been used successfully for retaining all of the teeth in the arch after regulating, by shaping thin metal to the labial and lingual sides of all of the teeth to be retained, after which a wire is shaped to come in contact with all of these. The two sides are next joined with small wires, passing over the arch as in the simple crib. Tin is then flowed over the spring and metals, joining them all. If the model is perfect and the appliance well constructed, a perfect adaptation is the result.

This retaining device will be of service in cases of simple fracture of the jaw. The metal clasps can be formed to fit a tooth as perfectly as an ordinary clamp. It can be made in sections and fitted to the teeth on either side of the fracture, and the two or more parts united after their suitable relationship has been found by the proper adjustment of the displaced tissues.

FIG. 16.

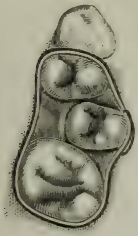
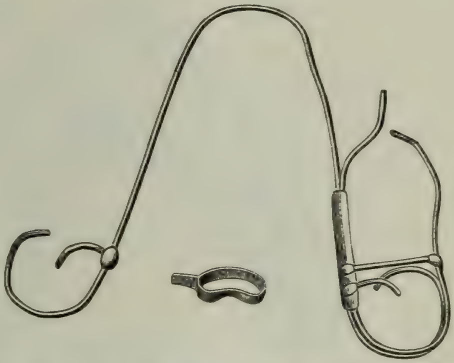


FIG. 17.

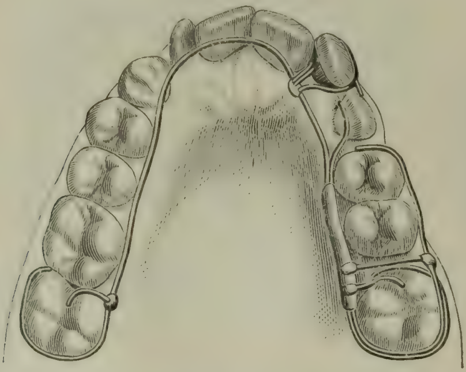


In a certain class of cases the following method has given satisfaction for drawing into line a bicuspid that has erupted inside or outside of the arch. A spring wire is bent in the form of a crib surrounding the irregular tooth and an adjoining one on each side, passing well up next to the gum on the labial and lingual sides, with the ends of the spring wire terminating upon the tooth to be moved and free to cause pressure upon it. Fig. 16 is an example.

The model here presented represents the teeth of a young lady sixteen years of age. Both of the lower first molars have been extracted, and the second molars have moved forward and taken their place. The upper front teeth are too prominent, the laterals being rotated outward so that their cutting-edges are across the arch. The crown of the superior left cuspid is about one-third erupted, and is coming inside of the arch, as there is insufficient space for it to erupt in proper line. All of the removed teeth and the superior left first molar had been extracted by a practitioner who inserted a vulcanite plate that covered the roof of the mouth and extended through the space made by the removal of the first molar, to form a clasp around the second molar, from which projected a metal point both on the labial and lingual sides of the tooth, for the attachment of four rubber rings which extended forward and were hooked over gold spurs that projected from a gold collar on the first and second bicuspids for the purpose of drawing them back to make room for the cuspid and lateral incisor. The appliance was well adjusted, but as the molar was very short it was not well retained.

The patient was referred to the writer, and a crib made in the following manner was inserted December 20, 1890.

FIG. 18.



A base wire was formed of No. 17 spring wire to follow the line of the lingual side of the teeth, its ends formed into clasps which extended nearly around each of the second molars. A long U-shaped spring was then placed on either side of the left second molar and bicuspids, the ends extending in front of the first bicuspid on either side. The two wires were connected in front of the molar by a cross wire having its ends flattened and curved around the two wires, which were also wound with fine binding wire, and all soldered with soft solder, using a soldering iron.

The inner spring end was shaped to press on the partially erupted cuspid to force it outward into place. The outer spring end was given a curve against the mesial side of the first bicuspid, the action of which drew both bicuspids backward. The appliance was anchored to the second molar, and was prevented from moving forward by resting against the lingual side of the incisors. (See Fig. 17.) One result is shown in Fig. 18.

A new appliance was then constructed to retain the teeth that had been moved. It was made with the partial tin clasps, contoured, and united to the base wire with solder as previously described.

Both laterals were to be rotated inward, and, as the teeth were very prominent, the second bicuspid on the right side was extracted, and the first bicuspid and cuspid were moved back by springs as described for moving the bicuspids on the left side. At the same time springs were added to the appliance for rotating the laterals, the principle of which was to attach a spring with a straight portion in contact with the lingual side of the tooth, and a spring attached to the base wire which extended in a curve to the labial side of the tooth. (See Fig. 19.)

FIG. 19.

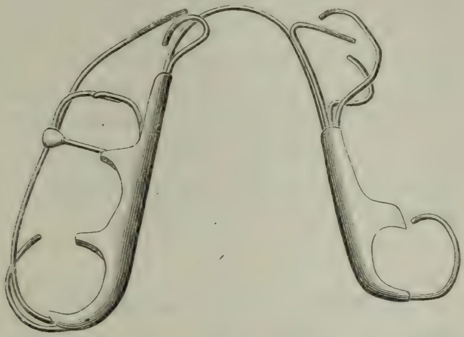
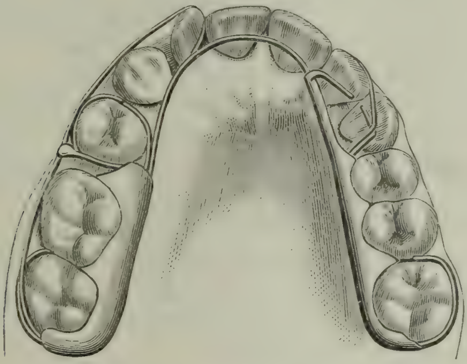


FIG. 20.



By gradually changing the angle of the springs, the teeth were rotated into proper position. (See Fig. 20.) The appliance was well retained, and additional springs were added as needed until there were nine in all. A complete retaining appliance was applied May 21, 1891, the space made by the removal of the bicuspid being almost entirely closed, the projecting incisors brought well inward, the arch made symmetrical, and the appearance of the patient remarkably improved.

Respecting this entire crib and spring wire system, special stress is laid on the following facts : (A) The materials—piano wire, tagger's tin, sheet copper, copper wire, tin, and soft solder—are inexpensive, and within the reach of all. (B) The crib and spring construction is simple and quickly done. (C) The clinging grip of the crib on its anchorage is sufficient to hold the fixture firmly, yet it is easily sprung off for cleansing or change. (D) Changes or additions are easily and quickly made. (E) The structure is light, cleanly, and occupies the least possible space in the mouth. (F) Its action is controllable, and free from risk of overaction. (G) It forms a perfect retainer.

Therefore its general adoption may reasonably be anticipated as soon as these facts shall have become known.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 956.)

THE USES OF VARIOUS FILLING-MATERIALS.

AN endless variety of materials has been suggested for replacing the portion of a tooth which has been lost by caries. But few have proven of great value, and no one material has been found to satisfy the demands of all cases. It is, however, no more necessary for the dentist to rely upon one filling-material than it is for the physician to use one drug with which to control all the diseases of mankind. We can intelligently care for all conditions, provided we have at least one method which will be useful in each given condition.

There is but one material which is best adapted for the filling of a given cavity at a specified time. Let us use that specially indicated material on every occasion, even if we should lose by the transaction. Let us refuse to use amalgam where gold should be employed, and equally let us fill with amalgam if best, even though the patient would pay more for gold. Few would deny the wickedness of placing a number of amalgam fillings in the incisor region, yet if gold can be used to best advantage it is equally wrong to improperly fill bicuspids and molars with some other material.

If one is to follow this rule of never filling except with that which is best adapted to the circumstances, it becomes necessary for him to be able to determine for all cases what material, or combination of materials, is best fitted to the occasion. Therefore, in speaking of the various materials, I shall endeavor to state where each is positively

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indicated, and leave the reader to discriminate for himself in less obvious positions.

The main reliance of dentists is upon gutta-percha, the plastics, and gold, but there are other materials which have been used, and of them I will make cursory mention.

Materials of Minor Value.—Lead has been used in children's teeth, and occasionally in well-defined cup-shaped cavities in adult mouths. Thin sheets of the metal are cut up into narrow strips and rolled into convenient sizes. They are retained in place by a process of wedging. This at once limits the cavities in which lead may be used to those having well-defined, strong surrounding walls. If omitted from the office, I believe it would never be missed.*

Tin has been used similarly to lead, with no special advantage. It has also been made into foil and used as soft or non-cohesive fillings are made. Before the introduction of amalgam, it occupied the same place which that material too often does now, for the filling of teeth *where a high fee could not be charged.* Except for this purpose, *which is an unprofessional one*, it has little value. Latterly, in combination with gold, it has been claimed to have special therapeutic effects not possessed by either metal alone. It is doubtful if this claim can be proven to be well founded. I will say more of it when considering gold.

Robinson's felt is a shredded metallic composition, which has a place in the office. It is claimed for it that gold will cohere with it, so that a cavity may be half filled with it and completed with gold. This is a delusion against which the inexperienced must be warned. It is true that in favorable cavities two-thirds of the filling may be made of the Robinson's felt, and gold may be used for completion, but there will be no cohesion. The union is purely a mechanical one, and only of sufficient tenacity to make manipulation easy. The felt must not extend so near to the surface that the remainder of the cavity would not of itself retain the gold. The felt must not be packed too tightly, but left sufficiently loose so that with a heavy serrated instrument the gold may be packed and forced into the felt. This will be readily accomplished, and the cavity may be completed with cohesive gold. The advantage of this method is that large cavities may be rapidly filled, and as well as if all gold were used. The cases where this is exclusively indicated are large molars from which the pulps have been removed, tremendous cavities needing to be filled. In many such cases it is preferable to use the felt rather than to have too large a mass of oxyphosphate underlying the gold, or of forcing the patient to submit to the exhaustive process of packing gold alone. It is claimed that this material also makes a good filling for temporary teeth, but in my judgment other things serve better.

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* I am not here considering the filling of root-canals.

Porcelain fillings, so called, are pieces of tooth-porcelain specially baked to fit a given cavity, and then retained by a cement. Hence it is obvious that the durability of such an operation depends upon the cement, which cannot be counted permanent, though more nearly so here than when used alone. The only excuse for using porcelain is the hope of matching the tooth in color. This is only accomplished by accident. The color of a given mixture will depend upon the degree of heat at which fusion occurs, and as this cannot be definitely measured, it becomes impossible to bake porcelain specially and produce a desired shade. This alone is enough to make the method disappointing, if not worthless. Porcelain inlays are different, in that the filling is made from porcelain already baked, so that color and shade may be selected to match, if a sufficient variety be at hand. Up to the present time inlays have been successfully made for only a small number of cavities. If a method should be devised by which the porcelain may be accurately ground to fit an irregularly-shaped cavity, there will be many cases where the inlay will be indicated : notably upon the labial surfaces of superior incisors.

Vitreous, or glass fillings, are made from a kind of glass, ground to a fine powder, which fuses readily over an alcohol flame. It is furnished in an assortment of shades, which it is claimed are reliable ; that is, that the powder from a given shade will always produce a given color. If this should prove to be true, this method may be useful occasionally. Of all kinds of fillings, however, which depend upon cement for retention within a cavity, I am inclined to believe that only temporary results will be obtained, and the practitioner should be cautious in making promises to the patient in whose mouth he attempts what is as yet in an experimental stage.

Gutta-Percha.—No dentist can afford to be without this most valuable material. Useful in many ways, it is perhaps most useful for temporary purposes. In the form known as "temporary stopping" it is immensely valuable. This is a combination mainly of gutta-percha and wax. Of those obtainable at the depots I prefer Gilbert's, because it has just the right proportions of the two materials. Those which have more wax are not as durable, and become too soft and sticky when warmed. The temporary stopping is furnished in two colors, presumably that the white may be used in conspicuous positions. There is a much better advantage to be taken of the two colors. The pink should be used only to cover arsenical dressings, or in such teeth where the condition demands that attention should be given to the tooth at the next sitting. The white becomes useful for teeth whose root-canals have been filled, or any other condition where it is not absolutely essential that the particular tooth should be operated upon immediately, to the exclusion of other possibly urgent cases.

Thus, when a patient presents, a glance in the mouth tells much. A temporary filling, white in color, the dentist may set aside for the time ; but a pink one acts as a signal, which would mean that delay would be dangerous.

A temporary purpose, which is served by gutta-percha plain, better than when in combination with wax, is where a patient presents with a number of dangerous cavities ; teeth in which a pulp-exposure may occur at any time. It is impossible to fill them all at one sitting with permanent materials. It is very wise, however, to cleanse them all of decay, and fill with gutta-percha. Thus all is made safe at once, and the permanent fillings may be placed at leisure.

As a permanent filling gutta-percha may frequently be depended upon. Either the white or the pink may be used, but my experience has been that the pink is more durable ; therefore in conspicuous places it is to be preferred. Much of the reported failure of gutta-percha as a permanent filling may be referred to faulty manipulation, or injudicious choice of the cavity in which to place it.

So far as manipulation is concerned, the common practice of heating the material in the flame is ruinous to all hope of permanency. It should be heated on a porcelain disk held over the lamp, or preferably over warm water on a glass tray. A special apparatus of this kind is purchasable. In placing gutta-percha in a cavity, should the cavity be a large one, it may be packed piece by piece, thus insuring adaptation to the walls, until two thirds of the cavity is filled. Then a single piece large enough to complete it should be used. In smaller cavities a single piece should be chosen large enough to slightly more than fill the cavity. After the filling has cooled and is hardened, the surplus should be trimmed off with a thin smooth burnisher, or spatula, slightly warmed, care being used not to drag the material away from the walls. In a few instances, as up under the gum margin, I have used to advantage a tape dipped in chloroform.

Places where gutta-percha is positively indicated are extremely sensitive cavities along buccal, palatal, or lingual surfaces, especially where they extend wholly or in part below the gum margin, in molar teeth. Here the pink variety is to be preferred. Where teeth have been worn by ill-fitting clasps, so that cavities filled with leathery decay have been formed, which when cleansed leave exposed hypersensitive dentine, they are more likely to be cured with gutta-percha than with any other material. It is better to be obliged to renew the fillings periodically than to risk death to the pulp by using a metal. Gutta-percha is not a non-conductor, but it is a poorer conductor than the metals, and what is more important, all the tissues of the mouth, whether hard or soft, are singularly tolerant of it. Occasionally a patient will present with a deep cavity in a most inaccessible approximal surface. Excavation makes it doubtful whether the pulp is nearly approached, or whether hypersensitive dentine alone is the cause of the pain. A very wise course is to temporize by inserting gutta percha. Too much examination may expose a pulp in a small cavity, thus necessitating a tremendous sacrifice of tooth-substance for its proper removal, whereas under a gutta-percha filling this class of teeth is frequently troublesome no longer.

Gutta-percha is often used as a capping over pulps which are nearly approached. Where this is done, and the filling completed with gold, common sense will indicate the advisability of covering the gutta-percha with a resistant body of oxyphosphate before attempting to pack gold upon it. Many, however, would not think this essential where amalgam is to be the final filling. It must be remembered that gutta-percha is slightly elastic. Therefore where it underlies amalgam or other metallic filling it must not be so placed that the superincumbent filling rests wholly upon it. In Fig. 63 is shown a cavity filled improperly. The amalgam, *a*, rests upon the gutta-percha, *b*, in such a manner that pressure during mastication has a tendency to compress the latter, allowing the amalgam to be driven downward away from the walls, thus producing leakage. In Fig. 64 the arrangement is better, for the amalgam, *a*, is now supported by the walls at the points *c*, *c*, so that movement under pressure is rendered impossible. Thus it becomes important not to insert too much gutta-percha under another filling in the vain hope of obtaining better insulation.

FIG. 63.

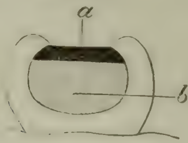
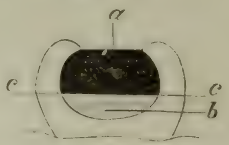


FIG. 64.



A solution of gutta-percha in chloroform, commonly known as chloro-percha, is useful for lining cavities before inserting a filling of oxychloride, thus preventing the pain from irritation by the chloride of zinc. It is also valuable, and should always be used as a coating for oxychloride or oxyphosphate fillings where the latter are meant to serve permanently.

Oxychloride of zinc, as a filling-material, is much less used than it was before the introduction of the oxyphosphates. As a permanent filling it is doubtful whether there are any conditions in which it is to be preferred to oxyphosphate. By some, however, it is earnestly claimed that if a plastic of this form must be used where erosions have occurred, the oxychloride will serve better than the oxyphosphate. This is a statement which may be true, but as yet it has not been proven. It may be true, but before it can be known to be true it must be explained why it should be so. This will not be possible until the etiology of erosion is less shrouded in mystery than it is at present.

One claim advanced is that the chloride of zinc, being a powerful germicide, is advantageous. Before we may depend upon oxychloride fillings for the reason that chloride of zinc is germicidal, it must be shown that *this action continues even after union with the oxide into a solidified mass.* Again, it must be proven that there is a relation between bacteria and erosion, and the special bacterium must be isolated. Then it must be shown that the oxychloride filling placed in a cavity will cause a resistance to the erosive action which may result from the presence of the bacterium. Meanwhile it is hazardous to depend upon oxychloride as a permanent filling in cavities near the gum-line. Innumerable instances have been reported and observed where in such positions a seemingly well-made filling has become wholly disintegrated, not only allowing decay around it, but apparently itself decaying. As this special case, for which this material has been advocated, does not really demand its use, it would perhaps be better to depend upon oxyphosphate where a plastic for a permanent purpose must be used.

Another advantage which this material is said to possess is the power to excite the tooth-pulp toward the production of secondary dentine. The idea is that in deep cavities where the pulp has been nearly approached, but not fully exposed, if oxychloride be placed as a capping, its therapeutic action will result in a deposition of secondary dentine by the pulp, so that the distance between the pulp itself and the bottom of the cavity is materially increased. Were this the case it would be most fortuitous, for no capping can be so good as tooth-bone itself. That a pulp has the power thus to protect itself is undoubtedly admitted, but I think I am safe in saying that it is a physiological action, rather than pathological. Under the slow wasting away occasioned by erosion, this new barrier is thrown out so that the pulp is constantly protected from the invasion. Erosive action has seldom been known to expose a living pulp, but we frequently see erosions which have passed beyond the original limits of the pulp-chamber, and into the new dentine which the pulp had formed as a protection. The question arises, whether an oxychloride filling can induce the same result? The difficulty of proof lies in this, that where it did accomplish this, there would be little temptation to remove the filling or the tooth for examination. Thus its failures can be more accurately counted than its successes. Another fact to be considered is, that just as in the case of erosions, the physiological action of the pulp would have the same tendency toward self-protection against the advance of ordinary caries. Indeed, where the carious action happens to be slow we not infrequently find it aborted by the resistant quality of the new dentine formed, so that we get what has been termed "arrested decay." It follows from this that any filling whose action is sufficiently negative not to interfere with the ordinary healthy action would seem to produce the desired result, merely because it does not prevent it. It is probable that where the oxychloride succeeds, it acts just as other materials do, by not creating an irritation.

That an oxychloride filling does possess some therapeutic qualities seems indicated by the fact that it may usually be depended upon to lessen the sensitiveness of dentine if left in a cavity a month or more. This of course may occur under one of oxyphosphate simply because the tooth itself has altered, but as it has in my observation occurred more frequently with oxychloride I deem it safe to say that an oxychloride filling has an obtunding effect.

The oxychloride being obtainable whiter than oxyphosphates, is preferable for lining discolored teeth where the walls are thin. Occasionally it may happen that it is desired to line a wall, and yet there may be a need to utilize as much of the cavity as possible for the proper retention of the filling. The thinnest imaginable layer of oxychloride may be effected by smearing the wall with the fluid and then blowing the powder against it with a chip-blower. It should be noted that this is apt to destroy the rubber bulb, because the oxide of zinc taken within the bulb acts deleteriously upon rubber, causing it to dry and crack. This may be prevented by careful washing after use.

Oxyphosphate of zinc is invaluable both for permanent and for temporary purposes. As much depends upon the manner of manipulating the material, I will explain how best to mix it. According to the method of mixing, the resulting mass will be either quick or slow setting, and either dense or crumbly.

First, then, as to its setting. The best mixing slab is the side of a flat glass bottle, which should be provided with a tightly-fitting rubber stopper. In the winter months, with the temperature of the room at 70° F., the bottle has no special advantage unless it is desired to make the material set either very slowly or very rapidly. If the bottle be filled with ice-water, the setting will be slow in proportion to the cold, and *vice versa*, if filled with hot water, it will be rapid in proportion to the heat. This is more useful in summer, when all have experienced much inconvenience because of the rapid setting of oxyphosphate, so that in warm weather a bottle of ice-water is very useful.

In mixing the material, the method must depend upon the use to which it is to be put. If a permanent filling is desired, put the powder and liquid upon the slab separately. With a clean, smooth spatula stir a little of the powder into the liquid until it is incorporated, producing a thin but well-mixed material. Add more and more of the powder until a thick, smooth cream is produced. This, of course, is still too thin to be used as a filling, *but no more powder must be added*. With the spatula continue to work the mass, when it will soon be observed that it begins to thicken and ball up on the slab. It now has a sticky quality, and may be used if it is necessary to depend upon adhesion to the cavity wall. If this is not the case, further working will produce a mass which may be taken between the fingers and worked as we do gutta-percha. Made into a roll, and cut into pellets with the sharp edge of the spatula, it is in a most convenient form to be packed into a cavity.

If oxyphosphate is to be used for setting a crown, it should be similarly mixed, and used at the creamy stage without further kneading. For *temporary* purposes, where it is desirable that the filling may be readily removed at a subsequent sitting, as, for example, where it is employed to cover an arsenical dressing in a shallow cavity, after the creamy stage, instead of kneading to produce thickening, continue to add the powder until the consistency is suitable for use. A mass thus made may seem the same as the other, but really it is quite different. There is an excess of the powder, and after hardening it can be more readily crumbled away with a sharp excavator. Thus there is a vast difference between the preparation for permanent or for temporary purposes. May not some of the failures recorded against the material be more properly attributable to its faulty manipulation?

It has been advised that during the mixing some germicide should be worked into the filling. In this way oil of cloves and other medicaments can be stirred in with no apparent harm to the material. Moreover, the odor of the disinfectant will be noticeable very long after, but whether there be any advantage in the process remains to be demonstrated.

Oxyphosphate as a filling-material has many uses, the most important of which is as a mass to be interposed between a metal filling and the tooth itself. It must be remembered that save in rare cases gold or amalgam furnishes no support to frail walls. In fact, the metallic filling depends largely upon the strength of the cavity walls for its permanency. The oxyphosphate, because of its adhesion, does support frail walls, and therefore is peremptorily required in all such cases. Unlike gutta-percha, there need be no limitation as to the quantity used, save that the cavity above it must be of a shape which shall be retentive for the metallic filling which is to cover it. In these cases it is preferable to place a portion of the metallic filling while the oxyphosphate is still plastic, for thus the upper filling is practically cemented into place. This process will be described later.

As a permanent filling oxyphosphate may be used in cavities where the more conductive properties of metal would prove injurious. It also should be employed in conspicuous positions, as, for example, large corners or labial festoon cavities in the incisor region, in the mouths of actors and actresses, ministers, singers, lecturers, and public speakers generally.

(To be continued.)

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PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, October 13, 1891, in the amphitheater of the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. Norman W. Kingsley, in the chair.

Dr. H. H. Sisson, of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, in the Lincoln Building, Fourteenth street and Union Square. Ninety-four dentists were present. . . . Dr. W. F. Davenport, of New York, filled an approximal cavity on the distal surface of the right superior central, using his polished grooved convex points and the hand mallet, although these instruments are especially adapted for the electric mallet. . . . Dr. Levi L. Howell, of Riverhead, L. I., filled a compound cavity on the anterior approximal and grinding-surfaces of a right superior bicuspid, using the Gibbs electric mallet. He also filled a distal cavity in a right superior sixth-year molar with amalgam, using the electric mallet to pack it. He used a matrix made of brass (though he prefers platinum for the purpose), which he intended to leave on the tooth for twenty-four hours. Dr. Howell also showed in the mouth of his patient a number of gold-tipped teeth in perfect condition, which had been in use for two years. He placed a tip of this kind on a cuspid for Dr. Baker, and will show the operation at another clinic. . . . Dr. M. Rynear, of New York, exhibited his new crown and safety pin. The crown having been adapted to the root, the pin is secured in it with fusible metal. The pin is flat, and has a slot in it to afford anchorage for the cement. The slot in the pin can be widened by means of a wedge-shaped instrument provided for the purpose, and the pin thereby spread to fit any size cavity in the root. The slot also admits a staple to be passed into it, which being attached to the pin and passing into the crown cavity adds very much to the strength of the adjustment. . . . Mr. W. E. Gibbs exhibited his electric dental mallet, which he claims is the simplest and most perfect of its kind. The form accommodates itself to the hand of the operator, being round and smooth. The blow is delivered by a sliding electro-mallet, and may be changed from the lightest to the heaviest in a moment. It is started and stopped by a push-button controlled by the foot, leaving the hand entirely free to guide the instrument and manipulate the filling. . . . Dr. Richmond showed a case of pyorrhea alveolaris, the treatment of which, he said, was both mechanical and medicinal, and that a cure was effected in three applications in May last. The gum-tissues have a healthy appearance. . . . Dr. F. A. Roy exhibited his sterilizer, made up of parts of a small coffee-urn, with a rack for long-handled instruments, and a small perforated cup for engine-burs, clamps, separators, etc. The apparatus is the result of some little experimenting, and now seems to be in a convenient form for general use. It is made by Flanders, 22 Fourth avenue, New York. . . . Johnson & Johnson showed their "cottonoid" preparation, which is an admirable substitute for napkins, and is both cheap and cleanly, as well as absorbent and sterilized.

Dr. Ottolengui, chairman of the Executive Committee, announced that the program for the season had been arranged. It will consist of essays and discussions upon topics of extreme interest and practical utility. The essayists will represent various sections of this country, and one paper will be sent by a distinguished American practitioner in Europe. The names of these gentlemen are not mentioned at this time, because unforeseen events may prevent a complete fulfillment of the program. Attention is called to the plan adopted for the discussions. Dr. Talbot, in a recent paper upon society management, said that a discussion which has been prepared in advance must of necessity be more valuable than that which is extemporaneous. He referred to our last anniversary meeting two years ago, which was managed upon this plan, as being the most valuable which he had attended. This society, therefore, having made a success of this plan to such an extent that it has attracted public mention, it has been determined to manage all of our meetings this season in this way.

Dr. Carl Heitzmann read the following memoir, and asked that it be placed upon the records of the society :

KARL WEDL.

On the 21st of September, 1891, Karl Wedl, a savant, who on account of his researches in odontology deserves an honorable mention before this society, died in Vienna, Austria. He was born in Vienna, October 14, 1815. Here he finished his collegiate studies, and received the degree of M.D. in 1841. After several years of general practice, he decided upon the pursuit of histological examinations, and obtained the professorship of this department at the University of Vienna in 1853. A large number of publications, mainly on topics histological and pathological, were issued by him, all of which bore the stamp of an honest and unbiased observer who did not care for speculations, not even for conclusions, but found satisfaction in describing what he observed with the naked eye, or with the microscope under comparatively low amplifications. This peculiarity of being strictly a matter-of-fact man may account for the little acknowledgment he found during life; another reason was his modesty, and his contempt of the judgment of contemporaries. His standard work in odontology, "Pathology of the Teeth, with Special Reference to Anatomy and Physiology," was published in 1870, with German and English text and a large number of illustrations on plates. Several years ago an enlarged edition of this work was issued,—a monumental work, indeed,—which ought to be in the hands of every dental practitioner who cares for the scientific aspect of odontology.

The president introduced Dr. C. Edmund Kells, Jr., of New Orleans, La., who read a paper on "Erosion: its Etiology and Therapeusis."*

Discussion.

Dr. Ottolengui read a paper prepared by Professor D. R. Stubblefield, of Nashville, Tenn., discussing the subject of erosion, as follows:

Mr. President, I regard the contribution by Dr. Kells as a success, because it presents fully a subject for consideration about which much doubt exists and much interest centers, because he has defined clearly his own views regarding that subject, so that we have distinct propositions with which to agree or from which to dissent. It exhibits original thought, and close personal attention to it clinically, which gives it a freshness that mere methodical compilation never has. Therefore he is to be thanked and congratulated. First, with reference to etiology, I think too much stress is laid on acid action, and too little on perverted nutrition in formative eras. His theory does not account for those erosions in parts comparatively remote from his source of attack. His figure of the pebble dropped into still water is strained, not to say false, unless he claims that the disintegrating action can be shown to be concentrically from the point of contact and the effect be always in the inverse ratio of distance from the center. I think, on the contrary, that the effect never is as regular as such a figure would give us to infer. He limits the cause, but not the effect, after saying that "no surface of any tooth is not susceptible to its inroads."

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* See page 1058, current number.

Again, the limitation of such disintegration he states is due to alkaline secretion from healthy neighboring glands, all within the area of a tooth's outer surface. He puts health in less than a line of disease in a membrane that is homogeneous. Continuity, with him, does limit inflammation as with a wall. The mucous glands are simple inversions of the mucous membrane, and it is not good surgery to deny that continuity is one method of the extension of disease along such a surface. Such a condition could not exist for long ; must be very mild to exist at all.

Finally, he speaks of limited erosion where universal acidity, he states, is present. If the cause is universal, why limit its effect?

In regard to treatment, I would take exception to his statement that the use of the electric needle would succeed, granting all he states previously, because it kills the hair-bulb. The hair-bulb is a distinct entity subject to the destructive action of heat, and is not replaced if the electrocution is perfect. Mucous glands, on the other hand, being sacs of inverted mucous membrane, would act like that membrane under other circumstances. The epithelial layer, the functional part, may be denuded frequently, and it is just as often reproduced. There can be no analogy between the two operations, except similarity in destruction of tissue.

Again, I doubt his ability, or any man's, to make a water-tight splint for the dental arch. If not water-tight, we believe it would soon favor rather than retard the action of any acid, and he claims the uniform presence of acidity in mouths where erosion is present.

Dr. E. C. Kirk, of Philadelphia. I want to thank the author of the paper for the great pleasure he has given me in listening to him, and also for his kindness in allowing me to first read over a copy of the essay. The paper covers such a wide field, and there are so many questions raised in it, that, if you will allow me, I will confine my remarks principally to the etiology of erosion.

I desire, in the first place, to correct an erroneous impression as to priority regarding the acid-mucus theory of erosion and my relation to it. I think I have had more credit given to me than is due to me in this matter. It belongs largely to Professor James Truman, of Philadelphia, who first advanced this theory, and my work afterwards was in extension of his original views.

The essayist quotes me as saying "erosion is caused by the solvent action of the secretions of certain mucous follicles in the buccal mucous membrane." While this is my belief, and though I still adhere to it, I prefer to restate what I did say in the paper which I read before this society in October, 1886, viz : "Some two years ago—before the Odontological Society of Pennsylvania—Professor James Truman advanced the idea that erosion is probably due to the solvent action of acid mucus, secreted by the follicles situated in the labial mucous membrane.''

Dr. Kells states as an objection to the general acceptance of this theory that ''no reason for the limiting of the eroded spots to such definite areas was assigned. Now if the teeth were only attacked upon their buccal and labial aspects, with which surfaces these acid secretions would come in contact, this theory would no doubt have long since been generally accepted as conclusive, but how are we to reconcile to it the fact that the lingual surfaces of the incisors will show marked signs of the disease?'' In answer to this, let me say, first, that so far as we have the published testimony of observers on the subject of erosion, I think we may conclude that the theory advanced by Dr. Truman has been generally accepted. The limitation of the disease, or rather of the solvent action of the acid mucus on the teeth, is inferentially if not directly explained (in my paper before referred to) by the localization of the acid-mucus secretion in certain glands, and represents a phase of the disorder before it has become general.

I called particular attention in my paper to the diagrammatic reproduction of the eroded areas obtained on the blue litmus paper employed in making the tests; and the limitation of the margins of eroded areas, if limitation can be properly applied to such areas when undergoing progressive enlargement, is determined by their relation to the groups of glands which are secreting acid mucus. As these increase in number and the oral mucous membrane becomes generally acid, as it frequently does, the erosion of the teeth becomes general.

Eroded areas occurring in positions remote from actual contact with the orifices of the mucous glands are readily explainable from the fact that in advanced stages, when a generally acid condition of the oral mucous membrane exists, we find the mouth usually deficient in secretions, the tongue, lips, and the whole lining membrane of the mouth hot and dry, presenting a livid appearance. Under these conditions the mucus becomes more or less inspissated, and lodges around the necks of and between the teeth, so that we have erosion occurring in unusual locations. I have seen all the teeth in the lower jaw completely girdled by this affection, with an ultimate loss of the crowns by fracture of the lower oral teeth at the gum margin, leaving only small conical peg like projections above the gum. As to erosion upon lingual surfaces of incisors, I can see no reason why it should not occur from the same acid-mucus secretion at the tip of the tongue, which has the same character of mucous membrane as that lining the rest of the oral cavity. I have frequently seen the incisors shortened by erosion of their cutting-edges, and I can only attribute it to an acid condition of the secretions from glands at the tip of the tongue. This view is held by Drs. Peirce, Jack, and others.

Dr. Kells states that "the grinding-surfaces of molars are frequently singled out and markedly affected by this process. In such cases there is great loss of tissue from these surfaces, while none of the other teeth are involved." I am inclined to think that the doctor has in this instance a case of mechanical abrasion to deal with; though it does not seem to me to be impossible that even in such an instance it might be the effect of a local, acid secretion from the buccal membrane or even of the parotid saliva, which came in constant contact with these individual teeth. Dr. William H. Trueman, in a paper before the New Jersey State Dental Society at its twentieth annual meeting and published in the *International Dental Journal* of February, 1891, page 90, reports a case of this kind, from which it also seems that Dr. William H. Trueman is not a believer in the acid-mucus theory as advanced by Dr. James Truman.

This morning I had a case in my office in which there was erosion of the buccal surface of the sixth-year upper molars. The erosion was so extensive that the apices of the roots of these teeth were almost uncovered. The duct of Steno was pouring the parotid secretion immediately upon the eroded area. The question as to the reaction of the saliva from these glands occurred to me, and I tested it, and found that the secretion was distinctly acid. The patient was a chronic sufferer from hereditary gout.

I have made a great many observations upon this subject of erosion, and am more strongly inclined than ever to the belief that the acid-mucus theory as advanced by Professor James Truman, and advocated in my paper before this society, is correct. The confusion which has existed in the minds of many regarding it and which may have retarded its general acceptance is in some measure, I think, due to the fact that the protean character of its manifestations in the teeth has led to difficulty in classifying its varied expressions in their proper relation to one general cause. But if we look upon erosion of the teeth not as a disease in itself, but merely the effect of some systemic derangement having a local dental expression, and its various, dental manifestations as but progressive stages symptomatic of a similarly progressive systemic disorder, we are likely to obtain a clearer understanding of it.

I am so fully convinced of the truth of the theory that I have about ceased to question in regard to it, and have devoted myself more particularly to investigating the cause of the acidity. Along this line my observations, so far, induce the belief that *erosion, strictly so called*, of the teeth *is in all probability a pathognomonic symptom of the gouty or rheumatic diathesis.* I have never yet met a patient with erosion fully established who was not a sufferer from gout or articular rheumatism, except in two instances, and in these a marked hereditary tendency in this direction existed; not only this, but according to my observation the converse is true, for I have always found erosion of the teeth present in gouty patients. It would throw much light upon the question if we had some means sufficiently delicate for detecting uric acid, which we could apply as a test to the mucus secreted by the buccal mucous glands in erosion cases, but so far as I am aware this cannot be done satisfactorily. It is well to remember, in assigning the gouty diathesis as an etiological factor in the condition we know as erosion of the teeth, that the gouty or lithic acid diathesis does not necessarily imply the occurrence of acute attacks of gout in a patient. Gout is regarded as a tropho-neurosis, affecting the digestive and assimilative functions, and is associated with errors in these that are expressed frequently as disordered liver, acid dyspepsia, diarrhœa, etc., while there may be no occurrence of acute gouty attacks, but all cases are characterized by an excess of uric acid in the blood-serum, secretions, etc.

It is evident, of course, if the relation between gout and erosion of the teeth is a causal one, that our efforts at treatment so far as prophylaxis is concerned must first of all be directed toward constitutional treatment. This should include proper hygienic and dietary measures, and the use of remedies which tend to the elimination of uric acid from the system. For this latter purpose I have recently used with beneficial results, so far as the systemic condition is concerned, a combination of sodium phosphate with salicylic acid. Its action is believed to be due to the sodium salt rendering the uric acid soluble by combining with the salicylic acid to form sodium salicylurate, which is eliminated by the kidneys. The local use of magnesium or calcium carbonates or of lime-water as a mouth-wash was not intended to be viewed as a curative measure, but simply as a prophylactic means to accomplish in a chemical way what Dr. Kells's splint is intended to do in a mechanical way.

Dr. C. Heitzmann. Not being a dentist, you do not expect from me any light as regards the etiology of this remarkable disease; but perhaps I can help you, in a manner at least, to some pathological aspects. If the theory be true that an acid mucous secretion causes this mischief, let me draw your attention to a discovery made by Dr. Abbott some years ago. Dr. Abbott observed peculiar morbid changes in the enamel, which led him to the conclusion that the enamel is not formed at once, but in superseding layers, so much so that the first-formed layers are the broadest. These he calls the crown layers. There are a number of such crown layers; whereas the layers formed afterward he terms neck layers, and shows that they are formed, as it were, by mere superaddition to the crown layers. If we look at an evenly ground vertical section of a tooth, we invariably see certain protrusions along the surface of the enamel, which look like sharp edges more or less pronounced. It occurs to me that should an acid be the cause of this disease, here we would have an explanation why the acid first attacks a horizontal line in the buccal or labial aspect of a tooth, and it would explain that eventually the last-formed layers are first attacked, since they are the thinnest. At the same time there is a possibility that the following layers lack lime-salts in a measure, and are not so thoroughly calcified as are the original crown layers. This is a mere idea that struck me while listening to the paper. If there be slight irregularities on the surface of the enamel, there is certainly a chance for a supposed acid to penetrate easier in these places than in others. Now, gentlemen, has anyone of you ever seen a pulpless tooth affected by this disease?

Dr. Kirk. Yes.

Dr. Heitzmann. I ask, because some have said that pulpless teeth are not subject to it. Enamel is a living tissue. If, therefore, an obnoxious agent, suppose an acid, has affected the enamel, it will be deprived of its lime-salts. But will it be simply melted or dissolved? No. It will first be disintegrated in a way which we know to be a return to its embryonic condition. From my own experience I cannot speak about this; but several years ago Dr. Bödecker prepared a large number of specimens of erosion of the dentine which seemed to me to solve the problem. My hands are bound, however. Dr. Bödecker discontinued his work in my laboratory two years ago and stopped his researches in this direction altogether, and I therefore cannot tell you anything about it.

As far as I know, the disease is extremely painful in some cases, and not at all in others. Where it is painful, I have again to recur to observations made in my laboratory, that is, upon the presence of living matter in the teeth. Dr. Bödecker, about twelve years ago, suggested that dentine is altogether a live tissue, containing plenty of living matter, especially in the region nearest the enamel. In cases where there is painfulness, the presence of this living matter, which Dr. Hart has shown quite recently to be a layer sharply marked, will explain the sensibility. Where there is lack of sensibility, we can explain this by assuming a local necrosis, or necrobiosis.

Just one word more about the pathological features of caries and erosion. Both are materially the same process. In 1879 nothing was known about bacteriology, and we spoke of micro-organisms generally. There is no doubt in my mind but that caries is largely caused by the presence of micro-organisms, in the sense affirmed by Dr. Miller. A living tooth, however, will not simply be eaten up by the micro-organisms, but will react in the shape of inflammation, as Dr. Abbott has claimed. A devitalized tooth may be eaten up, but that there occurs an inflammatory reaction in caries as long as there is life in the tooth, I believe is proved. It seems to me that this is the main point for the pathologist to discriminate between erosion on the one hand and caries on the other.

Dr. George S. Allan. I have taken a great interest in this subject, and thought of it a great deal, and made a few experiments, and of course have done my best, where patients presented themselves, to overcome the effects of this disease. Now, as regards the paper just read, I fail to see in what respect the theory that Dr. Kells has advanced differs to any great extent from that which Dr. Black has given us in "The American System of Dentistry," or that which Dr. Kirk so ably presented in 1886 before this society. Both these gentlemen, in speaking of the etiology of the disease, inferred first and only the resolvent action of some acid. Then Dr. Black frankly acknowledges that this action is modified in some way, but in what way he does not know.

There is a great deal to be said on this subject from a chemical standpoint. I doubt in case you presented the subject to a chemist, showed him teeth that had been acted upon by erosion, gave him the theory and the preventives, whether you could get him to give more than a doubtful assent to the acid theory, and yet I acknowledge that nothing else seems to meet the case. We suppose it is an acid, not because we know it is, but because we think it is an acid that causes it, and we know of no other agent or agents combined which could produce this singular result.

Dr. Kirk gives us an illustration—I speak from memory only—of the action of hydrofluoric acid on a glass plate. This only partially meets the case. You take a plate which has been acted on by the acid or acid fumes, and you will not find a place where there is an absolutely polished, even surface. The surface will be polished, but it will be uneven. The acid does not eat it off smoothly or perfectly, nor do the acid fumes.

In Dr. Kells's paper, in which he attempts to explain the action of the acids, he seems to think that the surface acted upon being deeper at the point where he would have the glands pouring out their secretions and then fading away gradually, is indicative so strongly as to be positive proof in his mind that it is caused by this acid.

Now, to uphold this theory you would have to suppose a line of glands, in a direct line almost, across the anterior line of the teeth, neither above nor below, and, moreover, with a gland opposite each tooth that is acted upon. All the teeth are acted upon in a straight line, not above or below it. You have erosion cutting a groove straight across the teeth. Under the supposition that it is an acid, and that it is modified in its action by the alkalinity of the saliva, it is incredible that it should eat out a notch of that kind.

Another thing : I think that we owe Dr. Kells our thanks for calling attention to the fact that erosion is not confined to any one part of the tooth, and that we find it almost as frequently on the grinding-faces of the teeth as we do on the other aspects. His theory, granting that it is true, that it causes the formation of a deep pit in the labial aspects of the teeth, would not account for the depressions in the grinding-surfaces of the teeth.

Taking, for example, a cuspid, where the enamel is worn off, and you find a deep pit scooping out the dentine, leaving the enamel untouched. There are cases where the enamel overhangs, forming a sharp edge there. On the supposition that it was an acid, and modified in its action by an alkali, it would be very difficult to account for that tooth being in that condition. You will find cases where it occurs, but they are rare. I do not think you will ever find a case of erosion on the grinding-surfaces of the teeth unless the enamel-surfaces of the teeth have been ground off by mastication. Again, take the grinding-surfaces of the molars and examine them ; take an articulation, as I have done, and examine the occlusion. You will find no indications whatever that it could have been caused by chemical agents alone.

I feel quite certain that where mastication may modify this condition it will not, as a substitute, account for the condition.

Dr. Kells alludes to some peculiar pathological condition of the tooth itself. I think the doctor has possibly there correctly theorized. I am sorry he cannot give us any more than a presumption, or present anything more than a theory ; but it certainly does look as if there were something in the teeth themselves that invited this peculiar trouble. I have noticed, and I think others have, too, that we do not have the same satisfactory results in filling these teeth as in others. I know that in filling the molars where they have been worn off, I am positive that failure from disintegration and death of the pulp occurs more frequently than in average caries cases. It indicates to me, at least, a low vitality in such teeth.

I wish Dr. Kells could have given us something positive that we could hold on to ; something new ; something that would account for these conditions, and thereby enable us more successfully to combat the trouble itself ; but although I would like to see that in the paper, I confess that I do not. He accepts the prevalent theories ; he gives us the same material that we have had to work on before, and practically he leaves the question precisely where we found it.

Dr. E. Parmly Brown. I would like to say that there can be no erosion without mechanical abrasion where it would be possible to have caries were it not for the abrasion. Show me a case of erosion, so called, that is not a case of caries with abrasion, and I will show it to be simple abrasion. Examine the first trace of caries on the labial surface: you raise the lips, and you see that dark stain which you call acid disintegrating the surface. That will resolve itself either into erosion or caries. When into erosion? When the tooth-brush comes along and does the eroding with the aid of acids.

On one occasion a farmer came to me, and I saw that erosion was eating away half of his front teeth next to the gum. He said, "I did that myself. When I was a boy, I was told that salt was good to rub on the teeth, and make them white. I rubbed them half a dozen times a day. When I put salt on the back of my hams, before smoking them, it eats its way into the meat, through the bone and down to the marrow. So it must be powerful enough to have some effect on the teeth."

Hydrochloric acid will be found in mouths where salt is used in excess.

I do not think toothpicks cause all those conditions I have seen in some teeth, nor the tooth-brush. Every case of so-called erosion is caused by abrasion of some kind, assisted by acid action on atrophied portions of the teeth. Erosion, assisted by mechanical abrasion, may be produced by a thousand different causes. The tooth-brush produces it on the left side of the mouth because the patient will hold the brush in her right hand, and scrub away. Where abrasion has not assisted in breaking down the polished surfaces, it is in every instance caries, and micro-organisms have set in. They are rubbed out of the eroded surface by some cause or other, and you call it erosion instead of caries.

Dr. Kells. Dr. Stubblefield asserts that a water-tight splint could not be made, and would be of no benefit even when made. Now, that is his opinion, but my experience in the matter has led me to other conclusions. In the case referred to, erosion was progressing rapidly. I covered the upper teeth for eleven months, during which time I could detect no further erosion. During that period the disease upon the lower teeth progressed as before. There is not the least doubt in my mind that the splint did protect the teeth, although I do not claim that it was water-tight, or that such a fit is at all necessary.

Dr. Kirk, I believe, seems to think that the mucous glands can lay over upon the grinding-surfaces of an individual molar. We frequently find the bicuspids in front of and the second and third molars back of the sixth-year molar in good condition, while the latter is cut down to one-half or one-third of its original height by erosion. It does seem to me absolutely impossible that the duct of a mucous gland could lay over and flood that surface with an acid and not have it also act upon the approximal surfaces of the adjoining teeth, which are in actual contact with it. It appears to me to be absolutely essential in such cases that there should be some inherent defect in that particular molar which allows it to yield to influences to which the adjoining teeth are not susceptible.

If any of you have tested the saliva, you must have noticed in how comparatively few persons it is of an alkaline reaction. I have a little daughter seven years old; in the morning I have found her saliva acid. I, myself, have an acid saliva, and neither of us is troubled with erosion. There must be something besides an acid condition that leads to this disease, and I believe I have stated what that is.

Dr. Kirk also referred to there being a gouty condition of the system. In the limited time allowable for my paper, it was impossible to elaborate every detail. While I believe there is a gouty tendency in the patient referred to when the erosion was so extensive, still I do not believe there is always such.

Dr. Allan says I have not brought out any new point. Perhaps not; still I think I have continued where Dr. Black left off. I believe I have outlined the "modifying influences" which are present in these cases. There is no doubt but that there is at times great difficulty in distinguishing erosion from abrasion; still they should not be confused.

Dr. Heitzmann has helped me out considerably with his explanations of the occurrence of erosion at the gum line, for which I must thank him.

On motion of Dr. George Evans, the society extended its thanks to the essayist of the evening, and to Drs. Kirk and Stubblefield for their contributions to the discussion.

Adjourned.

B. C. NASH, D.D.S., *Secretary.*

JOINT UNION MEETING OF THE NEW JERSEY AND PENNSYLVANIA STATE DENTAL SOCIETIES.

(Continued from page 1005.)

DR. H. NEWTON YOUNG, Wilkes Barre, Pa., presented casts of the jaws of a patient afflicted with acromegaly, and gave the history of the case as follows: Matthias M., German, age forty-eight, laborer. His father was a strong, healthy man, who died at the age of sixty-five years. His mother died during the patient's infancy, and he can give no information as to her health. He has two brothers and three sisters, all living and healthy,—at least they have never presented any abnormality of growth. He is married, and the father of three children, two of whom died in infancy. The survivor is a healthy young man, seventeen years of age. The health and growth of the patient were normal up to the age of thirty-one years, he having never been ill, except upon two occasions from abscesses, the first when he was about twenty-five years of age, attacking the left hip, and the second, a similar attack, occurring a number of years later, involving the right hip. From both of these he fully recovered. Symptoms of enlargement were first observed by the patient's wife, the hypertrophy taking place in his hands, and has since then been gradually but constantly increasing. The patient is five feet nine and one-half inches in height, and weighs two hundred and sixty-two and one-half pounds, with an increase of weight of seventeen pounds in twelve years. The cranium is normal in size and shape, and covered with a thick, well-preserved crop of gray hair. The forehead recedes from very prominent eyebrows ; neither the eyelids nor the ears are enlarged. The nose is large and broad. The upper lip is not at all enlarged, but the lower lip is very prominent and everted. The cheek-bones are prominent, caused probably by the dilatation of the maxillary sinus. The lower jaw is enormously hypertrophied and massive, the chin projecting forward and causing a decided prognathism. There have been so few cases of acromegaly reported that it would be difficult to describe all the typical symptoms, no two cases being exactly alike. The elliptical shape of the face and the hypertrophy of the feet and hands have been present in every case.

The etiology of the disease is unknown. Several of the patients have been syphilitic, but whether this has any effect in the causation of acromegaly is doubtful, nor has there been any proof of heredity. The disease occurs with about the same frequency in both sexes. It first appears between the ages of twenty and thirty years ; it is very slow in its progress, lasting twenty or thirty years or more.

In the present case the tongue of the patient is probably as large as my hand. I could not get an impression of that, but I did not have as much difficulty as I had anticipated in getting an impression of the jaw, as his mouth is very easy of manipulation from the fact that I could put my two hands in, press the impression compound into position, and hold it there till it hardened. There is some enlargement of the upper jaw, but very little in the soft tissues.

His feet and hands are correspondingly large.

Dr. Joseph Head, Philadelphia. I would like to inquire if there is any known remedy, or whether any remedy has been suggested for cases where the disease is less extensive?

Dr. Young. I have not given that part of the subject any thought. I took the casts and presented the history of the case merely as a curiosity. There have been only about six cases reported. It seems to be an acquired and not a hereditary disorder.

Dr. Louis Jack. The case has one point of importance, in that it bears upon the possibility of interstitial growth of the lower maxilla.

Dr. Beck. I would like to ask Dr. Jack if he considers this a case of interstitial growth?

Dr. Jack. I should consider it as presenting evidences of interstitial growth.

Dr. J. A. Osmun, Newark, N. J., called attention to the usefulness of gold crowns in the correction of certain irregularities of the teeth, for example, when the lower teeth strike on the inside of the upper in a manner to force them outward. "Years ago we used to grind off the lower teeth to relieve that difficulty, but of later years we have placed upon the lower molars gold caps, one or two on each side of the mouth. Leaving the mouth in that way for some time, the elongation of the other teeth will bring about a perfect occlusion, when the gold caps may be removed if thought best."

Dr. S. C. G. Watkins, Mont Clair, N. J. I wish to relate a method which I used successfully in the treatment of a case of pyorrhea alveolaris. A lady who had been under treatment for this trouble for several years applied to me. I found the palatine root of the superior first molar specially affected, so that the pericemental connection had been destroyed nearly to its apex. My treatment was simply to amputate the palatine root with a fissure bur, and cap with oxyphosphate. The two buccal roots were in good, healthy condition at that time, and almost immediately she exclaimed that she "had not felt such comfort in years." Up to the present time it is in a healthy condition.

Dr. Head. How did you control the patient while you cut the root off?

Dr. Watkins. It hurt scarcely at all. There was no especial pain in cutting the pulp off, but afterward the air coming in contact with it caused pain, which led me to treat it with a capping of oxyphosphate.

Dr. Osmun. I had a similar case of five years' standing. I intended to remove the tooth, but at the patient's suggestion I removed the palatine root, and it is in good condition at the present time.

Dr. Root. In performing this operation I use a disk for cutting a groove in the root. I then take a pair of excising forceps and cut the root off. I have had three cases of this kind, which have been entirely successful. The operation affords immediate relief.

Dr. C. A. Marvin, Brooklyn, N. Y., presented a paper, which was read by Dr. Watkins, entitled "Pulpicide, the Best Assurance of Safety and Usefulness," an abstract of which follows:

The treatment of exposed pulps is an old subject, about which so much has been said and written it would seem that nothing remains to be added. And yet the question arises, Has it been settled satisfactorily? If so, then truly the subject may be relegated to the ranks of finished topics. If it has not been satisfactorily settled, then it is properly a subject for further consideration, upon which any new light possessed by any practitioner should be thrown, to the end that we may advance toward a final and satisfactory solution of the difficulty, which shall result in a uniform and sensible system of practice.

We are all of one mind as to the truth that meets us at the starting-point, *that life is a valuable possession, to be guarded and prolonged by the employment of our best ability*, whether it be conscious life with intelligence, sentiency, as characteristics, or mere existence,—whether muscular life or neural life.

Now to advance a step. What do we understand by this word "life," and what makes it valuable? I answer: clearly to perform the functions assigned to it, and to do this uniformly, naturally, without friction, without discomfort. Such a condition makes life—any life—valuable.

Let a finger or toe, an arm or a leg, become diseased and useless, a source of distress and a menace of future ill, and the decision is quickly reached,—amputate it. We are certainly justified in applying the same principle to the dental organs. A living tooth is better than a dead one for several reasons: it is stronger, better able to resist mechanical injury, better able to endure changes in temperature, less liable to decay caused by the action of acids in the mouth, less subject to the many diseases which affect the roots of teeth and the periosteum; is more useful in being endowed with the keen sensibility that perceives the first touch of occlusion and measures the force of pressure.

If the tooth becomes sick, either from decay or fracture, and the pulp is exposed, or influenced without actual exposure, pain supervenes, usefulness is lost, and discomfort substituted. This state of things must be corrected. Pain must be expelled, and comfort and usefulness restored. How shall this desirable end be achieved? If we find a simple exposure, and conclude that the pain is caused by draughts of air, or suction, or contact of foreign substances, or the friction of mastication, and *that there is no organic disease*, our course of action seems plain, viz: to protect the exposed pulp with a suitable covering and fill the cavity. Scores of cases are so treated, and with success. But if the pulp is not quite healthy, if it has received injury from sudden and severe pressure, or from long exposure, or from contact with some powerful agent used to "cure" toothache, then the operation of covering and filling is not at all certain of being successful. On the other hand, it is quite certain to be followed by aggravated pain, positive disease, and misery untold. It will be seen that this uncertainty of result all hangs on one thing, viz: the decision of the question, Is the pulp healthy? If so, it will remain quiet under its filling, when that filling is properly introduced; if it is not healthy it will rebel, and trouble will ensue.

Now, I contend that it is a very difficult matter to decide as to the health of the pulp, and still more difficult to determine as to the degree of unhealth up to which conservative treatment may be hopefully employed, and beyond which such treatment is likely to fail. The ordinary tests are by no means infallible, and such as are delicate enough to be employed in determining the condition of so exceedingly delicate a structure as a dental pulp have not yet been discovered, or at least revealed. So that we are much in the dark in respect to this essential point, and seriously at a loss how to settle it. Fitting applications may be made to diseased muscular tissue, in order to coax it back to health, but as yet we are without agents that are fitted to the very highly organized—almost spiritual—tissue of a dental pulp. Our efforts are well meant, but our materials are too harsh. We may benumb, but not restore. Afterward, when the benumbed condition passes away, health not being restored, irritation follows, then inflammation and congestion, and at last ulceration or an abscess.

Now in this uncertainty, what is more gratifying than to know of a course of treatment likely to be followed by none of the evils specified? and what is wiser than to adopt it? Throw sentiment aside, lay extreme science on the shelf, and do that which will insure to the patient freedom from suffering as well as usefulness of the organ. Devitalize the pulp, remove it thoroughly from the roots, disinfect and fill with a non-conducting material, then finish the operation by inserting a perfectly packed gold filling, and the end is achieved.

Now, if this be so, why not always do it? Why not thus, not only prevent pain and remove uncertainty in the operation, but also take away the ground of criticism from some members of our profession, who are too ready to seize upon some unsuccessful case upon which another practitioner has expended much effort and thought, but without the hoped for result, and hold that case up in a paper or on the page of a magazine as a proof of incompetency or unfaithfulness? But it may be asked, What becomes of the advance which all true professional men desire to see made, if no one is ready to strike out into new ground, or attempt to overcome difficulties hitherto deemed insurmountable? In answer it may be said there will always be some men earnest enough in the search for truth, bold enough to defy criticism, patient enough in pursuing the difficult path, to insure in time valuable advancement. And it may be said also that there are many true-hearted men ready to encourage and aid such efforts, and rejoice in their success, if success shall follow. Still, we are brought face to face with the question, Is it right to subject our patients to pain and possible loss of an organ by pursuing a course in the interests of science, when another course, not so scientific, would probably spare them that pain and make that organ useful? And weighing both sides, and in the light of present attainment with the imperfect means at hand, the conclusion reluctantly advanced would seem to be justified,—devitalize and extirpate. I say reluctantly advanced, for personally I resort to this course only when driven to it, preferring to meet frequent failures rather than abandon all effort to discover a path through the thicket. I make this statement boldly. I am trying constantly to preserve the pulp-life of decayed teeth, with variable success, while at the same time I do not hesitate to affirm what is stated in the title of this paper,—"Pulpicide the Best Assurance of Safety and Usefulness." That I affirm to-day, with present knowledge and present means. Next year I may not, for some earnest, faithful soul, ignoring the charge of unthoroughness, may still seek the light and may find it, may discover tests to determine the exact condition of sick dental pulps; may bring to notice agents whose employment shall be able to restore to health such sick pulps, and so introduce a new era of usefulness into dentistry, the era of strictly conservative dental practice.

(To be continued)

ANNUAL CONVENTION OF THE FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

THE annual convention of the above-named societies was held in the parlors of the Iroquois Hotel, Buffalo, N. Y., on Tuesday, Wednesday, and Thursday, October 27, 28, and 29, 1891.

FIRST DAY—*Afternoon Session.*

The convention was called to order at 2 P.M., Dr. F. W. Low, of Buffalo, in the chair.

In his opening address Dr. Low gave a short sketch of the joint work of the societies, endeavored to stimulate those present to earnest work for the growth of their local societies, extended to all a hearty welcome to the city, and an invitation to visiting dentists to the privileges of the floor and to take part in the discussions. After transacting the usual routine business, Dr. Frank French, of Rochester, N.Y., read a paper, of which the following is an abstract, entitled,—

TREATMENT AND DESTRUCTION OF THE PULP.

Some years ago at a meeting of the Dental Society of the State of New York there was present a gentleman who, accosting one of the older practitioners, said, "Well, Dr. Blank, I suppose you save all nerves?" The reply was, "Yes, certainly." "Will you tell me how you save them?" "Yes; some of them I dry, and some I save in alcohol."

While I do not by any means advocate the wholesale destruction of the pulp of the tooth,—for I believe in saving it alive if possible,—I think most practitioners of fifteen years' standing will agree that those which have been dried and saved in alcohol are far more satisfactory, both to patient and dentist, than those which have been capped, excepting, of course, those where the conditions were entirely favorable.

We all of us have cases where for a variety of reasons it is advisable to destroy the pulp. How can this be done with almost absolute certainty and with the least discomfort to the patient? Under the head of "Incidents of Office Practice," in our district and also our city society, it has been mentioned several times that difficulty had been experienced in destroying the pulp even by several applications of arsenical paste, and that great pain and much consequent discomfort to the patient had followed. During a practice extending over many years it very rarely happens (not more than once or twice a year) that I have to make a second application to destroy a pulp, and almost as rarely that it is attended with pain. I do not lay claim to anything new or original, but I do know that I save my patients much suffering, and for this mercy they are truly grateful. Any process of destroying the pulp other than that of immediate extirpation takes time. The action of the various medicaments for destroying the pulp when applied to it are as follows: Irritation, congestion, inflammation, death. The pulp, as we all know, while of fair size in the body of the tooth, gradually grows smaller as it approaches the apex, until where it passes through the apical foramen it is scarcely more than a hair in size. The effect of the medicament used causes a determination of blood to those parts; the vessels become congested and inflamed; the opening at the foramen is so small that it is closed by the enlargement of the vessels; the circulation is stopped, and the pulp dies from strangulation.

We can readily see that while this is going on, the whole of the pulp-cavity being filled by the pulp, the pressure against its walls would be such as to cause intense pain. To guard against this I always make a full exposure of the pulp before making an application. This gives an opening or vent for relief from the increased pressure. I have used but one thing to destroy the nerve for many years, and that is arsenic. I am aware that many decry it, and attribute most pernicious effects to its use, but so far I know of nothing better. I do not use the arsenic of commerce, which, notwithstanding its cheapness, is largely adulterated. I use pure crystal arsenic, and the quantity required is so small that a piece the size of a small marble ought to last ten years or more.

Having made a free exposure so that I can see it, I touch the exposed portion with pure carbolic acid; then take a piece of crystal arsenic, and with a knife or instrument scrape a very little of it into powder. I then twist a piece of cotton, the size of a pin-head, on a smooth nerve-instrument so loosely that it is easily detached, moisten it with carbolic acid, and take up as much of the arsenic as will adhere to it, and place it upon the exposed pulp, but without any pressure. I then place a small concave metal disk over it in such a manner that it rests upon the walls of the cavity and effectually prevents any pressure upon the nerve; then fill carefully with gutta-percha. If there is no pressure upon the nerve, you will have no pain. If there is pressure, you will hear from it at once, which means remove and start again. These disks are about one-eighth of an inch in diameter. I usually make a quantity by punching them from thin sheet-iron. Do not, to save a little trouble and time, cover the arsenic with cotton dipped in sandarac instead of gutta-percha. It is a slovenly way to work, and it is not safe. I have seen many cases where the arsenic has escaped from the tooth, destroying the process between the teeth, not infrequently causing the loss of the tooth itself. I prefer to let the arsenic remain five, six, or seven days, as then the nerve can generally be removed whole, does not break and tear, as it will where it has only been allowed twenty-four hours; is quite tough and leathery, and can be removed with no pain except when it separates from the live portion. If after three or four days the tooth becomes sensitive to the touch, remove the filling, cap, etc., and it will return to its normal condition in a day or two, when the pulp can be removed. All this takes time, but take all the time necessary to do the work well, and make a proper charge for the service rendered.

Discussion.

Dr. C. S. Beck, of Wilkes Barre, Pa., being called upon to open the discussion, said the treatment described in the paper was similar to that which he practiced in the main, but different in some particulars. His preparation of arsenic was the pure crystal, ground in creasote, with the addition of a little sulphate of morphia to overcome the pain caused by the arsenic. He destroyed comparatively few pulps, preferring to cap them, even if the operation was not always successful. To destroy the pulp he considers twenty-four to forty-eight hours amply sufficient, and he never applies arsenic to an inflamed pulp, as the inflammation will destroy the pulp without any application. In answer to a question by Dr. C. S. Butler, as to what treatment he gave an inflamed pulp, Dr. Beck said he applied rubber-dam to the tooth, opened up the pulp-chamber as thoroughly as he could, and washed it with warm water, cleaning out all débris from the cavity. Sometimes he used a remedy which would lessen the inflammation, such as a solution of iodine, oil of cloves, tannic acid, cocaine, or any local remedy that would accomplish the purpose.

Dr. French, in answer to a question, said that the use of the disks to relieve or avoid pressure from the inflamed pulp was essential if suffering was to be avoided, as the pressure of the congested pulp against the sides of the pulp-chamber will cause intense pain if there is not space for it to swell.

Dr. R. H. Hofheinz said he had found that to puncture the pulp would save the pain caused by the application of the arsenic. He used equal parts of arsenious acid and iodoform rather than arsenic alone, and said that in cases where one application of arsenic did not destroy the pulp the reason was that the pulp had not been opened up sufficiently.

Dr. W. C. Barrett said that it is a generally accepted fact that the pulp passes down and out of the apical foramen. This is not true of the partially developed teeth of the young. As the tooth becomes fully developed it is the fact that the apical foramen closes in more and more. But there is no such thing as an artery which can be traced from beyond the pericemental membrane through that until it enters the foraminal opening, thus forming a direct communication between the arterial system and the pulp. The blood-supply of the tooth comes from the periosteum. This membrane surrounding the tooth is an exceedingly vascular organ, and little twigs from it may pass right through the side of the root of the tooth almost anywhere, and in this way as well as by the apical foramen is the tooth nourished. The arterial supply always comes from the pericementum ; in fully-developed teeth this almost always passes through the foramen, which, however, is seldom a single open aperture, but is a collection of canals similar to the delta region at the mouth of a river. Blood-stasis is not what produces the death of the pulp, but the peculiar destructive and escharotic effect of the arsenic disorganizes and causes its death. The pulp never was destroyed by inflammation closing up the apical foramen and causing strangulation. If it was in this way that tissue was destroyed, what could be said of arsenical ulcers in the cheeks?

Dr. Beck asked Dr. Barrett if the blood passed from the pericementum to the pulp through the tubuli of the tooth.

Dr. Barrett said that in young persons it might form a Haversian canal, and pass through the substance of the tooth. In teeth not fully calcified these can be found by forcing gutta-percha through the tooth. He had seen teeth in which gutta-percha had been forced through ten or twelve openings through the sides of the root. As the teeth are fully calcified, these canals fill up, but the foramen will rarely be found to be a single round opening with a single arterial branch, but almost always several openings.

Dr. W. W. Coon said in destruction of cancerous tissue by arsenic it certainly was not by strangulation of the nerve, but by a peculiar effect of the arsenic on the tissue; it seems to be an effect confined to diseased tissue. His experience had been that arsenic left in the pulp-canal six or seven days would cause discoloration of the tooth, and was liable to cause pericementitis or periodontitis. Twenty-four hours is long enough in the teeth of the young, and forty-eight in those of older persons.

Dr. French, in closing the discussion, explained that the discoloration of the teeth sometimes seen when the pulp was destroyed with arsenic did not depend upon the time the application remained in the tooth, but arose from some peculiarity of the tooth itself; he said that the use of carbolic acid in inflamed pulps was merely for sedative effects.

Discussion closed.

Dr. M. O. Cooley read a paper, an abstract of which follows, on

Antral Abscess as a Result of Alveolar Abscess.

I am about to discuss with you the treatment of antral abscess as the result of alveolar dental abscess, which we as dentists are most frequently called upon to deal with. With antral abscess, as with other diseases, different practitioners employ different methods by which they arrive at the same results.

I have endeavored to formulate the teachings of my experience, together with what I have read on this subject that seemed practical and to the point, and I give it to you with the earnest desire that you shall discuss it freely.

Before entering into the details of this subject, it may be well to review a portion of the anatomy and physiology of the antrum and the parts associated with it, for the purpose of refreshing our minds.

The antrum of Highmore is an irregular, triangular-shaped sinus, situated in each of the superior maxillary bones, with its base facing the nose, and its apex the malar process. The floor of the orbit is its roof, and the alveoli of the molar teeth its floor; its only opening is a small foramen, starting from its base or nasal aspect, opening into the middle meatus of the nose, and has as its boundaries portions of the turbinated, ethmoid, and palate bones. The size and shape of the sinus varies to quite an extent in different individuals; in fact, there is often a marked difference in the right and left sides of the same individual. It is said that the average-sized antrum will contain about one and a half fluidounces. It is larger in the male than in the female, having thicker, stronger walls. In an adult it diminishes in size as age advances or if the teeth are lost.

It is not at all infrequent that there are one or more septa of bone in the floor of the antrum, which, in case of disease, add very much to the difficulty of its treatment.

It is lined with a mucous membrane, which is continuous with that of the nose and the mouth. The antrum in a normal state indirectly communicates with the frontal sinus through intermediate cavities, known as the ethmoidal and sphenoidal cells, and the mucous lining of the antrum is also common with these cavities.

The mucous membrane lining these cavities is made up of ciliated cells, a provision of nature by means of which the antrum is enabled to rid itself of secretions which would otherwise accumulate and become offensive.

The relationship which exists between the teeth and the antrum has been found by many of us to be a close one, as in many instances the roots of one or more of the teeth penetrate the floor of the antrum.

There are many lesions which the antrum is heir to, but the one most frequently met with is the result of a broken or abscessed tooth, usually a second bicuspid or first molar. There may not be any great amount of pain in the teeth, but there is a sense of fullness, a pressure in the face which, as the engorgement increases, becomes almost unbearable. A sense of fullness and pain is also very pronounced in the frontal sinus.

With these symptoms in view, the first consideration is to remove the root or tooth, which we will suppose has abscessed, the pus from which has found its way into the antrum. This will usually afford an opening through which the accumulation of pus will find an outlet, whereupon the pain in most cases will subside ; but the treatment does not end here, for until nature has made the necessary repairs the secretion of pus will continue, and it is imperative that the opening be large enough to accommodate a tube of gold or silver, which shall be at least one-quarter of an inch in diameter. After the drainage-tube is in place, a clasp-plate should be adjusted to the adjoining teeth, which will serve to keep food from finding its way into the antrum.

In cases where trouble has existed for some time prior to treatment, necrosis is very liable to be present, and should be carefully looked for. If there should be any, it is usually found near the tooth or root which has given rise to the trouble, and in this location is easily removed by use of the dental engine. If necrosis is suspected of having made any progress within the antrum, a simple means of detecting it is to stuff the cavity full of absorbent cotton, allowing it to remain until it has swollen by the moisture it will absorb, until it fills the cavity in every part, when it may be removed. If there be no necrosis, the cotton will not pull apart and catch on to the walls of the antrum, as the mucous membrane will be unimpaired, and there will be no exposed and rough surface of the bone to become entangled in the fibers of the cotton, as would be the case should necrosis exist. However, anyone with sufficient experience can with a probe readily detect necrosed bone, but I consider the cotton, in the hands of the inexperienced, the safer and more reliable.

Now the question arises, How shall we deal with the necrosed bone? In some cases it may be necessary to make the opening sufficiently large to admit of its removal by surgical means, but in the majority of cases this is not necessary, for by administering systematically a tonic treatment, such as syrup of hypophosphites or cod-liver oil, and wholesome diet, in conjunction with local treatment, which shall be stimulant and disinfectant, the sequestra will be exfoliated and repair will take place without an operation. Our homœopathic brethren claim gratifying results from high potencies of silicia, calcaria carb., and phosphorus.

The progress made in cases of long standing is often very slow, sometimes requiring several months of careful and persistent treatment, while those which are taken in hand in the early stages are by far less obstinate, and the possibility of effecting a permanent cure is proportionally more flattering.

I have no doubt if we were to examine the sockets of all the superior first molars we extract, that the number whose roots are found to perforate the floor of the antrum would astonish us, and we would marvel that there are not more cases of antral abscesses than there seem to be.

I am led to believe that in not one case in ten, antral abscess follows the extraction of a tooth whose roots perforate the floor of the antrum. The temperament, general health, and recuperative power of the patient have a very strong bearing on this point.

Nasal catarrh offers serious resistance to the treatment of what might otherwise be simple cases to handle, especially in this damp climate. Owing to the catarrh, the mucous membrane of the nose becomes hypertrophied, closing the natural outlet of the antrum, thereby rendering it impossible to close the artificial opening. Moreover, the inflammation is more difficult to control. It is well understood that an inflammation once begun in the mucous tract has a tendency to spread and involve other organs having the same lining.

For example, a child who is erupting teeth has an inflammation, which is at first circumscribed, of the gum-tissue surrounding the tooth about to erupt. Gradually it becomes diffused, affecting the mucous membrane of the mouth and fauces, and in many instances the whole mucous tract, causing diarrhœa, convulsions, and sometimes death. The mucous membrane of the antrum bears a similar relation to that of the nose. The mucous membrane of the antrum is low in vitality, as a result of the abscess, and has no power to resist the inflammation from the nose. As a consequence we have a very stubborn lesion to deal with.

In his system of oral surgery Dr. Garretson states that "The antrum once fully and fairly opened in the floor region, a practitioner is not to attempt its closure. As a rule it will not close, and the writer's experience impresses him that closure, as a rule almost without exception, is the worst thing that can happen. Once fairly exposed by a break in its floor, an antrum never again physiologically voids itself through the nose, the reason for this being that the ciliated expression of the antral mucous membrane has lost its office as a result of the disease that caused the opening."

This statement does not apply to cases where teeth have been extracted, whose roots have penetrated the floor of the antrum, where no disease existed prior to the extraction of the tooth, for as a rule these cases will readily close, provided the outlet into the nose is unobstructed. Hence the importance of getting the catarrhal affection under control at the earliest possible moment. Situated as we are in the lake region, with its damp climate, catarrh is more or less prevalent, and anything like a permanent cure is to be obtained only by going to a higher and drier place, *and never returning*. I may have put this somewhat strongly, but I have just been treating a case of this character, and my efforts were unavailing until such a change was made, when improvement began, and in a short time the trouble was apparently over. When patients present themselves for treatment they are usually more or less run down systemically, as the result of suffering, loss of sleep, absorption of pus, and the consequent loss of appetite. They should be placed under tonic treatment, as before described, and should take plenty of exercise in the open air. Their diet should be that which is most wholesome and nutritious.

In the local treatment of this condition, cleanliness is of the first importance. The chances of recovery are far more encouraging where cleanliness alone is observed, than where the most skillful medication is practiced without regard to cleanliness.

The remedy for cleansing purposes which has proven most efficacious in my hands is Marchand's peroxide of hydrogen, thrown into the cavity by means of a syringe. This should be followed by injections of a solution of sulphate of zinc, one or two grains to an ounce of water. If there should be much pain, one or two grains of chloral may be added to each ounce of the solution. There are other remedies which may be equally good, such as a mild solution of carbolic acid in glycerin and water, listerine, or sanguinol, used with an atomizer. Some practitioners advocate the use of sulphuric acid, creasote, nitrate of silver, and other escharotics. There may be cases in which they are indicated, but experience of others has taught me that they do more harm than good. We can easily appreciate that where we have an unhealthy granulation these remedies come in very happily where judiciously applied, their use to be followed by mild stimulant and tonic treatment.

Antral abscess, like chronic periodontitis, demands slow and persistent treatment, with mild, soothing medicaments.

Discussion.

Dr. W. C. Barrett thought there were more cases of hyperemia of the antrum than were generally supposed. The antrum was analogous to cavities found in all the large bones of the face, and the lining mucous tissue was the same as that of the oral cavity, and its diseases are those to which mucous membrane is liable. A catarrhal condition of the Schneiderian membrane will cause trouble in certain cases by closing up the natural opening into the antrum. The principal cause of disease in the antrum, however, is the opening into it by the roots of teeth. Sometimes pus forms, and this causes a breaking down of the glands of the mucous membrane. All the treatment necessary is to cleanse out the cavity thoroughly with tepid water, and apply soothing remedies. He advised that they should go slowly about applying peroxide of hydrogen, and said that he at one time nearly blew a man's head off with it. He had injected into the antrum without allowing sufficient vent for escape of the gas from the effervescence, and the pressure caused such agony that the man went nearly crazy for the time. His treatment is to rinse out the antrum with tepid water ; if there is no entrance caused by the root of a tooth piercing the floor, you may easily open through the buccal wall, but this will not give drainage. To get this, an opening must be made through the floor of the antrum. In case the second bicuspid or first molar is absent, enter through the vacant space, or if the tooth is not sound it had better be sacrificed. Otherwise provide for drainage by piercing the floor between these teeth. It is desirable to have the opening large,—big enough to admit a lead-pencil. With an opening of this size it is safe to introduce peroxide of hydrogen. Follow this with emollient remedies, and if pus is present, with an antiseptic fluid just strong enough to keep the cavity aseptic.

Dr. A. P. Southwick related a case of a patient of his who had come to him with an abscess in the antrum, his whole face swelled up, and his eye almost crowded out of the socket. He commenced the treatment of the case, but the man did not return after the first day, but submitted to home treatment of poultices. The brain subsequently became inflamed, causing death within two weeks.

Dr. Cooley, in closing the discussion, said that some cases of antral abscesses were very obstinate, requiring long and careful watching and treatment. He had never had any trouble from the injection of peroxide of hydrogen, he supposed because he was careful to have the opening large enough.

The discussion was closed, and the convention adjourned to meet at 8 P.M.

(To be continued.)

ANNIVERSARY MEETING OF THE FIRST DISTRICT DENTAL SOCIETY.

MEMBERS of the dental profession are cordially invited to attend the twenty-third anniversary meeting of the First District Dental Society of New York, to be held at the hall of the Academy of Medicine, 17 West Forty-third street, New York City, January 18, 19, 20, 1892.

Each session will be devoted to the consideration of a single topic: an essay being read by an eminent practitioner, which will be followed by special discussion which will be prepared in advance by prominent men who will have been supplied with copies of the papers. After this the usual general discussion will ensue, in which all are invited to take part.

The clinics will be devoted to the exposition of entirely new devices, methods, medicaments, etc. Persons desiring a place on the clinical program should address immediately, Dr. F. A. Roy, chairman of the Clinic Committee, 148 West Seventieth street.

Those who decide to attend this meeting are requested to notify Dr. R. Ottolengui, chairman of the Executive Committee, who will supply them with full information as to hotels, railroads, etc.

M. L. RHEIN,
GEO. H. WINKLER,
R. OTTOLENGUI, 115 Madison avenue.

MARYLAND STATE DENTAL ASSOCIATION.

IT has been decided to postpone the time of meeting of this association from December 14, 1891, as published in the November issue of the DENTAL COSMOS, till May, 1892. Due notice of the exact date will be given.

CYRUS M. GINGRICH, *President.*

THE ST. PAUL DENTAL SOCIETY.

At St. Paul, Minn., on the fourth day of November, a number of dentists met and organized the St. Paul Dental Society. The spirit manifested points to a successful and harmonious consummation of the wishes of those who have the interests of the project at heart.

The officers elected were as follows: Dr. C. H. Goodrich, president; Dr. B. C. Cornwell, vice-president; Dr. Charles A. Van Duzer, secretary; Dr. T. H. Jacobs, treasurer.

Charles A. Van Duzer, *Secretary.*

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The Proceedings of the National Association of Dental Faculties for 1891, containing compiled rules, can be procured by sending to the secretary,

J. D. Patterson, D.D.S.,
Keith and Perry Building, Kansas City, Mo.

A CORRECTION.

My attention has been called to the fact that the name of the Dental Department of the National University of Washington, D. C., does not appear in the "list of colleges which the National Association of Dental Examiners recommends to the various state boards to accept as reputable." In justice to that college, I would state that the omission is an error, the correction of which the state boards will please take notice.

Fred A. Levy, *Secretary N. A. D. E.*

Orange, N. J., Nov. 12, 1891.

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EDITORIAL.

A QUESTION OF ETHICS.

Upon no ethical question in dentistry has the profession been so singularly divided as upon the patent issue. Much has been said and published relating to this many-sided topic, and the arguments of its champions and opponents would fill volumes on the rights and wrongs of patent rights. The problem is far from being settled, negatively at least, as it is doubtful if the formal action of any dental organization has operated to exclude the patentee of a dental device from participation in its meetings; if such action has been taken, the records of society transactions demonstrate that the law upon this point is practically inoperative. It seems fair to assume that the great majority of dental practitioners are favorable to the patentee of a dental device, and admit his ethical right in the main, whatever limitations they may individually set up for the exercise of that right; and until the question is fearlessly and dispassionately discussed and settled on its merits, followed by an explicit and authoritative declaration by the governing dental bodies, the law of individual ethical standard must operate to keep it an open one. If such action could be had at the present time, judging from the attitude of the greater number of practitioners upon the subject, it would probably result in the recognition of the professional patentee with restrictive limitations as to the character of his invention. The somewhat complex character of the problem, including as it does so many factors, not the least of which is the fundamental one of priority in the relation of one's duty to himself and his duty to society, this involving, as it does to a large extent, the instinct of self-preservation, must in the nature of the case present difficulties of solution which can only be met upon broad ethical grounds. In all probability a satisfactory solution will only be reached by a natural working-out process analogous in its operation to that which determines the equalization of supply and demand.

A related question, and one which in the minds of many appears to be somewhat involved in the patent-right problem, is that concerning the ethical status of the proprietors of patent medicines and nostrums. Just why the ethical status of the patentee of a dental appliance and that of the proprietor of a nostrum used in dental practice should be regarded as in any sense similar, is difficult to understand; but that they are frequently classified together and the same general stigma of reproach applied to both, can only arise from a superficial understanding of the merits of the respective cases, and upon such an important question there should no misunderstanding. The code of ethics adopted by the American Dental Association, while it makes no reference to the question of dental patents, is exact and explicit in its denunciation of the use and recommendation of proprietary medicines. In Sec. 3 of Art. II, on Maintaining Professional Character, it says, "It is unprofessional to circulate or recommend nostrums, or to perform any similar acts." According to recognized authority, a nostrum is "a medicine, the ingredients of which and the method of compounding them are kept secret for the purpose of restricting the profits of sale to the inventor or proprietor; especially a quack medicine."

In the February issue of the DENTAL COSMOS attention was called to the character of some of the proprietary compounds largely advertised among dentists, and the powerfully poisonous nature of their ingredients specified. We have had recently brought to our notice a preparation of the same class, the activity of which depends, as we found by analysis of the mixture, upon a combination of cocaine, chloral hydrate, carbolic acid, and camphor, to be used by hypodermic injection for the painless extraction of teeth. To use such a combination with full knowledge of the exact amounts of its ingredients, with the dosage intelligently graded in relation to the age, temperament, and systemic condition of the patient, may be and is a legitimate proceeding; but to place such a preparation in the hands of practitioners for indiscriminate use who do so not only in sublime ignorance of its composition but with the guarantee, either implied or stated, that it is absolutely safe, is a proceeding which should be and in some analogous instances is classified as a legal misdemeanor. The physiological effects of an excessive dose of cocaine have been pretty fully studied, and the course of remedial treatment for cocaine-poisoning prescribed with such reasonable clearness that an intelligent practitioner should be able with the knowledge at command to successfully combat its ill effects, especially when forearmed with the knowledge of the amount of the drug he had administered; but inasmuch as the greatest use of nostrums is made by those whose knowledge is generally deficient, the danger to life involved in their indiscriminate use becomes an ethical question upon which the dental profession should express itself in unmistakable terms. So long as prominent dental organizations with their wide-reaching influence continue to give countenance and full hearing to the claims made by quacks for their productions, the evil will continue to thrive. That such is the case the published records of transactions show. And while men can be found who value life by the measure of dollars and cents, just so long will the charlatan and the quack continue to acquire the latter at the risk of the former.

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BIBLIOGRAPHICAL.

A HAND-BOOK OF INDUSTRIAL ORGANIC CHEMISTRY. Adapted for the use of Manufacturers, Chemists, and all interested in the Utilization of Organic Materials in the Industrial Arts. By SAMUEL P. SADTLER, Ph.D. Philadelphia: J. B. Lippincott Co., 1891. Octavo, pp. 519. Price, cloth, $5.00; half morocco, $5.50.

The obligation of modern civilization to the applications of industrial organic chemistry is immeasurable, but is rarely recognized outside the circle of those directly interested in its technical pursuit.

A vast literature in the aggregate has been developed in relation to the subject, though few works sufficiently comprehensive in scope to include the whole field have appeared. These few, however, are so voluminous and encyclopedic in character that they fail to meet the need of a large class who require a full but not exhaustive knowledge of the subject.

In view of the many industries based upon operations whose multifarious details depend upon correct application of the principles of organic chemistry, it would seem to be a hopeless task to creditably compress within the limits of a moderate-sized hand-book a description at once clear and yet sufficiently full.

The present work, however, meets the requirements of such a treatise, and within about five hundred octavo pages gives a most satisfactory presentation of the entire field covered by the industrial applications of organic chemistry.

The subjects treated embrace Petroleum and Mineral Oils ; the Fats and Fatty Oils ; the Essential Oils and Resins, which includes a study of caoutchouc, gutta-percha, and similar products ; Starch and its Alteration Compounds ; Fermentation Industries ; Vegetable Textile Fibers, which, besides paper-making, includes the processes of manufacture of gun-cotton, pyroxyline, collodion, and celluloid ; Textile Fibers of Animal Origin ; Animal Tissues and their Products ; Industries based upon Destructive Distillation ; Artificial Coloring-Matters, comprising the methods of manufacture of Coal-Tar Colors ; Natural Dye-Colors, Bleaching, Dyeing and Textile Printing.

The book is fully illustrated, furnished with useful tables, schematic delineations of methods, etc., and a copious index. It is a pioneer in its especial field which will be cordially welcomed by those who desire to keep abreast of the rapid advances being made in this important department.

HANDBOOK OF MATERIA MEDICA, PHARMACY, AND THERAPEUTICS. Including the Physiological Action of Drugs, the Special Therapeutics of Disease, Official and Practical Pharmacy, and Minute Directions for Prescription-Writing. By SAMUEL O. POTTER, A.M., M.D. (Jefferson), M.R.C.P. (London), Professor of the Theory and Practice of Medicine in the Cooper Medical College of San Francisco, late A. A. Surgeon U. S. Army, etc. Third edition, revised. 8vo, pp. 767, *with thumb index in each copy*. Price, cloth. $4.00 ; leather, $5.00. Philadelphia : P. Blakiston, Son & Co., 1891.

Dr. Potter's handbook is a most admirable condensation of almost everything that is of value within the range of subjects treated. It furnishes the student and practitioner with a large mass of useful and reliable material in a form at once compact and readily accessible. We know of no other single volume which so fully embraces the main essentials of practical materia medica and therapeutics, or in which the data are presented in such concise and clear phraseology. A most satisfactory feature of the work is the section upon Pharmacy and Prescription-Writing, in which minute and definite directions for the framing of prescriptions as an aid to the elucidation of this, to many, difficult problem are given. The section upon Special Therapeutics is particularly interesting and valuable, as are also the data contained in the appendix relating to the definition and pronunciation of many Latin names and phrases used in medicine, in addition to Hypodermic Formulæ, Treatment of Poisoning, Differential Diagnosis, Obstetrical Memoranda, Clinical Examination of the Urine, Tables of Specific Gravities, Weights and Measures, etc. A copious index is added to the volume.

DENTAL MEDICINE. A Manual of Dental Materia Medica and Therapeutics. By FERDINAND J. S. GORGAS, A.M., M.D., D.D.S. Fourth edition, revised and enlarged. Philadelphia: P. Blakiston, Son & Co., 1891. Octavo, pp. 524. Price, cloth, $3.50.

Former editions of this elaborate work have been extensively noticed in the DENTAL COSMOS as they appeared from time to time. The present one is considerably amplified by the embodiment of the more recent contributions to the subject. The elimination of certain errors and inaccuracies would greatly enhance its usefulness. For instance, the distinction on page 66 which the author makes between erosion and corrosion is vague and unwarranted. The characteristic indications of the tongue, page 71, should be revised in the light of the more recent bacteriological researches in this direction. On page 322 occurs the statement that creasote does not coagulate collodion, while on page 324 directions are given for producing a coagulum of these two substances. The directions on page 470 for producing silico-fluoride of sodium will not make that compound, but will make hydro-fluosilicic acid. Many of the chemical formulæ are either incorrect or misleading; for example, ammonium carbonate is represented by the remarkable formula $N_4H_{18}C_3O_9$; cadmium sulphate by $3\,(CdO.SO_3)+SHO$; chlorinated lime by $CaCl_2O_2CaCl_2$, which probably means $Ca\,(ClO)_2\,CaCl_2$. Antikamnia, a proprietary medicine, is represented by C_nH_{2n-6}, which is not the formula of a substance, but a general group formula. The formula of potassium hydrate, KOH, is incorrectly written HKO; and upon what ground the sodium bicarbonate should ever be called sesquicarbonate of sodium is not clear. The elimination of such errors is distinctly called for in a work of this character.

TRANSACTIONS OF THE DENTAL SOCIETY OF THE STATE OF NEW YORK, Twenty-second and Twenty-third Annual Meetings, held at Albany, N. Y., May, 1890–1891.

The transactions of this important society are here presented in a very attractive form, and the last two years' proceedings bound together make a book of some 264 pages. There are several papers of more than ordinary interest, some of which are likely to prove of permanent value to the profession. It is a good sign when so much expense and pains as are here apparent are taken to put on record for future use the transactions of our leading societies.

PAMPHLETS RECEIVED.

Seventh Report of the State Board of Dental Examiners of Wisconsin, 1891. La Crosse, Wis.: Spicer & Buschman, printers, 1891.

DENTAL LEGISLATION.

OKLAHOMA DENTAL LAW.

HEREWITH we print the "act to regulate the practice of dentistry within the Territory of Oklahoma," which went into effect December 25, 1890. The board of examiners appointed under the act has elected the following officers: G. F. Dean, president, Oklahoma City; D. A. Peoples, secretary, Guthrie; J. S. Nicholson, treasurer, El Reno. Following is the text of the law:

Be it enacted by the Legislative Assembly of the Territory of Oklahoma:

SECTION 1. That it shall be unlawful for any person to practice or attempt to practice dentistry or dental surgery in the Territory of Oklahoma without having first received a license from the board of dental examiners, as hereinafter provided.

SEC. 2. A board of dental examiners is hereby created, whose duty it shall be to carry out the purpose and enforce the provisions of this act. The members of such board shall be appointed by the governor, and shall consist of five practicing dentists, residents of Oklahoma Territory, who shall have been engaged in the continuous practice of dentistry or dental surgery for at least two years prior to the passage of this act. In case of a vacancy occurring in said board, such vacancy shall be filled by the governor.

SEC. 3. Said board shall keep a record, in which shall be registered the names and residence and place of business of all persons authorized under this act to practice dentistry or dental surgery in this Territory. It shall elect one of its members as president, one as secretary, and one as treasurer thereof, which election shall hold during the term for which the incumbent was appointed, or during his or her residence in the Territory. It shall meet at least once in each year, and as much oftener and at such times and places as it may deem necessary. A majority of such board shall at all times constitute a quorum, and the proceedings thereof shall at all reasonable times be open for public inspection.

Sec. 4. Every person who holds a diploma from a recognized college of dentistry, or who was engaged in the practice of dental surgery in the Territory three months previous to the passage of this act, and who has been regularly engaged in the practice of dentistry for three years next preceding the passage of this act, shall within six months thereafter cause his or her name, residence, and place of business to be registered with the board of dental examiners and pay the fee hereinafter provided, whereupon the board shall issue a license duly signed by a majority of said board, and such license shall be *prima facie* evidence of the right of the holder thereof to practice dentistry or dental surgery in the Territory of Oklahoma.

Sec. 5. Any person desiring to commence the practice of dentistry or dental surgery in the Territory of Oklahoma after the passage of this act shall, before commencing such practice, file for record, in a book kept for that purpose, with said board of dental examiners, his or her diploma, or a duly authenticated copy thereof, and pay the fee as hereinafter provided, whereupon the said board shall issue to such person a license, the same as provided in Section 4 of this act. *Provided, however*, that any person who shall pass a satisfactory examination before the said board regarding his or her qualifications to practice dentistry or dental surgery, and pay the fee as hereinafter provided, shall also be granted a license as provided in Section 4 of this act.

Sec. 6. To provide for the proper and effective enforcement of this act, said board of dental examiners shall be entitled to the following fees, to wit: For each license issued to persons engaged in the practice of dentistry or dental surgery in this Territory three months previous to the passage of this act, the sum of three dollars; for each license issued to persons not engaged in such practice three months previous to such passage, the sum of ten dollars.

Sec. 7. The members of said board shall each receive the compensation of three dollars per day for each and every day actually engaged in the duties of their office, which, together with all other legitimate expenses incurred in the performance of such duties, shall be paid from fees received by the board under the provisions of this act, and no part of the expenses of said board shall at any time be paid out of the Territorial treasury. All moneys in excess of said per diem allowances and other expenses shall be held by the treasurer of said board as a special fund for meeting the expenses of said board, he giving such bond as the board shall from time to time direct, and such board shall make an annual report of its proceedings to the governor by the fifteenth day of December of each year, together with an account of all moneys received and disbursed by them in pursuance of this act.

Sec. 8. Any person who shall violate this act by practicing or attempting to practice dentistry or dental surgery in this Territory without first complying with the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined in a sum not less than twenty-five dollars, nor more than two hundred dollars, or by confinement in the county jail for not more than six months, or by both such fine and imprisonment, in the discretion of the court. *Provided*, that nothing in this act shall be so construed as to prevent physicians and surgeons or other persons from extracting teeth, and all fines collected under this act shall belong to the common school fund of the county where the offense was committed.

This act shall take effect and be in force from and after the final adjournment of this legislative assembly.

PUBLISHER'S NOTICE.

CLOSE OF THE VOLUME.—THE NEW YEAR.

IN reminding subscribers that the present issue closes the volume of the DENTAL COSMOS for 1891, a word or two upon the marked feature of dental literature during the year may be permitted.

That there has been a notable improvement is unquestionable. The year has been prolific of papers of superior quality. The pages of the journals, the archives of the societies, have been enriched by invaluable contributions, whose abundance has at times caused embarrassment to know what to do with them all. This is especially gratifying to the publisher, as it affords unmistakable evidence that the literary faculty is developing rapidly, vigorously, and truly, concurrently with the scientific work accomplished. The lesson of it to dentists is the stimulation it provides to labor to surpass this year's work with that of the next.

In the presentation of this great mass of useful matter the DENTAL COSMOS has done its part, and its publisher "points with pride" to the more than 1100 pages—not one of which we are persuaded was without value to some practitioner—which the volume contains. The constant pressure upon our pages for months past has compelled frequent additions to the regular number. Feeling that this pressure is more likely to increase than to abate, we have decided to enlarge the capacity of our reading pages for the coming year nearly twenty per cent. This will be accomplished not by adding more pages nor by decreasing the size of the type used, but by omitting the leads from the greater portion and making some slight changes in the typography. The only difference observable in the pages will be their more solid and substantial appearance. The new arrangement will begin with the issue for January, 1892.

As to the policy of the DENTAL COSMOS, that is sufficiently indicated by its past. Its aim will be, as heretofore, to present in the best manner the best that dentistry affords. The DENTAL COSMOS claims to be *de facto the* independent dental journal, and it requires but a brief comparison of its pages with those of other dental periodicals to substantiate the claim.

We invite prompt renewal of subscriptions.

Subscription price, $2.50 a year, in advance. Postage free to United States, Canada, and Mexico.

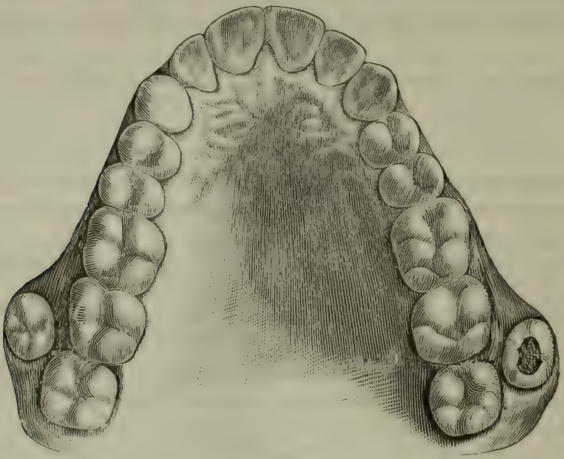
Postage to Universal Postal Union countries, 50 cents additional.

THE S. S. WHITE DENTAL MFG. CO.

HINTS AND QUERIES.

Supernumerary Molars.—This case, which came under my charge a few weeks ago, may be of interest to the dental profession in general:

A gentleman forty-one years of age applied to me for the treatment of a left upper molar which was badly decayed. An examination of his upper jaw revealed the presence of four molars on each side. Before removing the decayed tooth I obtained an impression of the upper jaw with the abnormality, which is shown in the illustration. Upon inquiry I found that the supernumerary molars had erupted about six years previously, the patient being at that time thirty-five years of age.—S. M. Hartman, L.D.S., Victoria, B. C.



Splints and Stalls.—Physicians and surgeons, no less than dentists, are interested in whatever may be conveniently and quickly made to conform to a circumscribed part of the human body, and firmly retain such form during a longer or shorter period of time. The "ideal base-plate," originally designed for strictly dental uses, I have found to be specially adapted for the immediate construction of small splints, or compresses. From its present supply-form of small plates, say three by four inches, only minor splints as finger-stalls can be readily made, but no doubt the inventor may be induced to make sheets of say ten by twenty inches for general surgical uses.

One has only to take one of the small "ideal" plates, hold it over a smokeless flame or near a hot fire until softened, and then quickly mold it around the bandaged finger, trimming it while still soft with the knife or scissors. The material is not sticky short of a melting heat, and when plastic is so easily modeled into shape without the slightest recoil or spring that the greatest satisfaction is experienced in the result, which is light, stiff, strong, odorless, non-absorbent, and smooth.—H. S. W.

Quickly Made Temporary Plate.—Suppose a case where a root is being treated preparatory to crowning, and the patient does not wish to go without a tooth until the operation is completed. Take an impression, make a model, form on it a plate of Head's ideal base-plate, build up the material for the backing, select a rubber tooth, heat and press it in place. The plate may be readily formed by softening in hot water. Use dry heat for building up the backing and for attaching the tooth.—B. H. Catching, Atlanta, Ga.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

THIS bibliography will be continued monthly in the DENTAL COSMOS, and will furnish as complete a record of dental literature as can be gleaned from current periodicals and transactions of societies.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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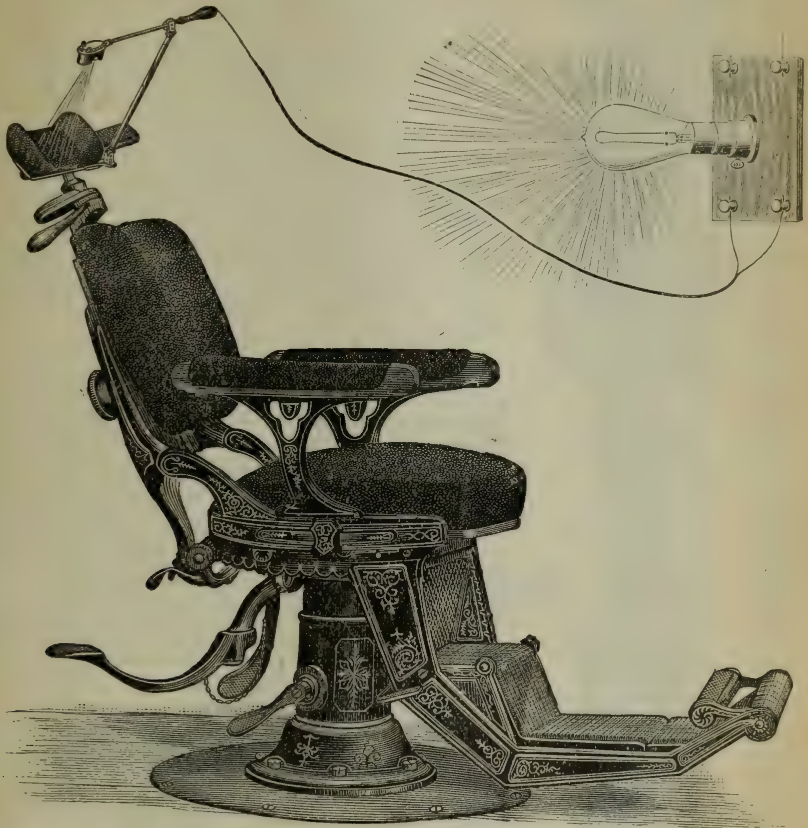

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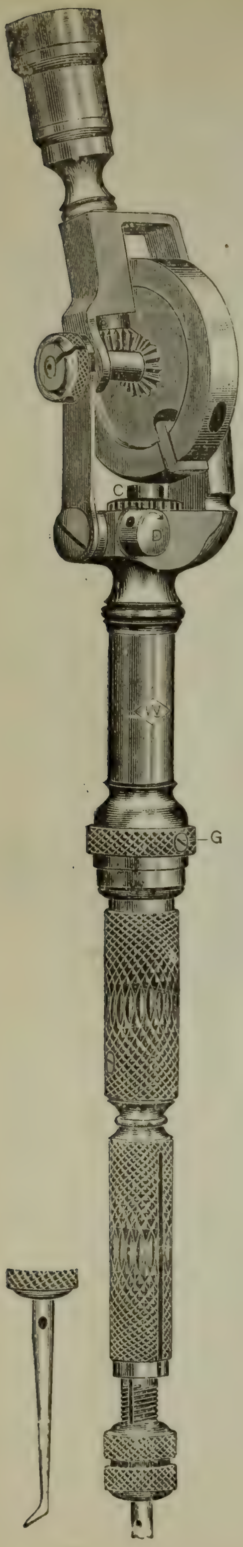

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Reissue June 17, 1879.

In this Mallet the blow is delivered by a revolving hammer, a metal wheel with a steel plate let into its rim, and projecting sufficiently to strike the head of the plunger at each revolution of the wheel. The other end of the plunger is hollow, and split in three sections, for the reception of the plugging point. It will hold securely the Snow & Lewis, Cone-Socket, or Engine-bits.

The rapidity of the blows is only limited by the speed at which the engine is run. The force of the blow can be varied by running the engine faster or slower, or by greater or less pressure on the plugging-point, or by squeezing the split portion of the case. As sent out, the Mallets are properly adjusted for use, and on no account must the hammer projection be disturbed. All the adjustment necessary is to be accomplished by turning the adjuster. This revolves a worm-gear, which moves very slowly, permitting an adjustment as close as the thousandth part of an inch. No change ought to be necessary except from wear.

The Mallet is held in the hand like a pen or pencil, with the two first fingers resting upon the squeeze-nut, and the thumb against the milled portion of the case. This manner of holding it gives complete control of the working of the Mallet. The blows may be intermitted temporarily without stopping the engine, as in picking up and placing the gold, by simply extending the fingers, thus removing the end of the plunger from contact with the hammer; or the blows may be made almost continuous, by flexing the fingers; or the plugging-point may be turned and directed by a movement of the thumb and fingers.

The milled portion of the case is swiveled at G, to permit change in the position of the plugging-point.

The Mechanical Mallet No. 1 can be used with the No. 4, No. 6, No. 7, or No. 8 Hand-pieces, with or without the Slip-Joint Connection, and can be operated by any of our Engines. The illustration shows the Slip-Joint Connection.

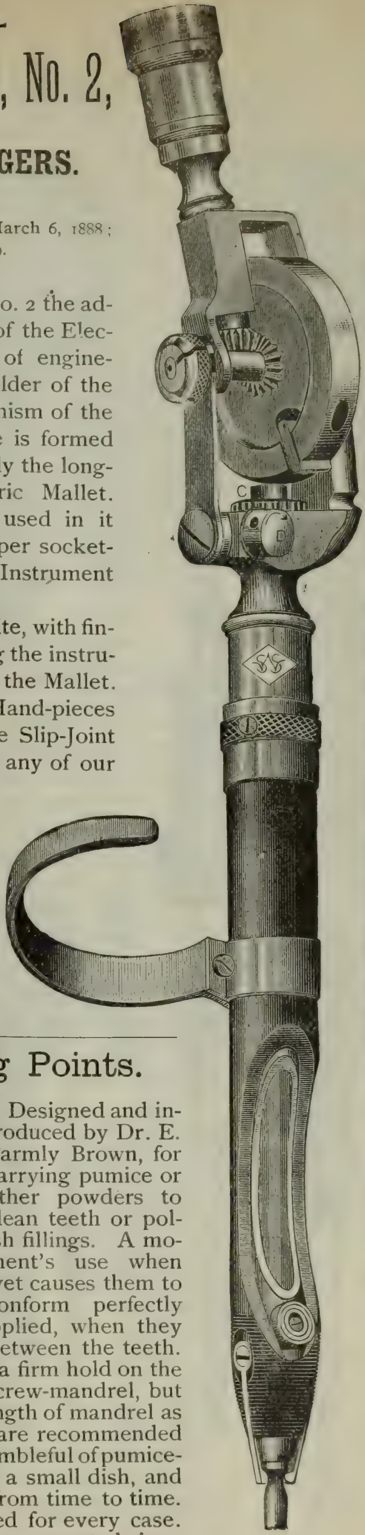
Directions for use with each Mallet.

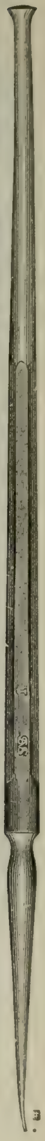
Price $15.00

In ordering, be sure to indicate which attachment is wanted.

THE BONWILL
Improved Mechanical Mallet, No. 2,
FOR
ELECTRIC MALLET PLUGGERS.

Patented October 15, 1878; February 18, 1879; March 6, 1888; April 30, 1889. Reissue June 17, 1879.





In the Improved Mechanical Mallet No. 2 the advantages of the form and construction of the Electric Mallet are adapted to the needs of engine-work. By combining the stem and holder of the Electric Mallet with the striking mechanism of the Mechanical Mallet No. 1, an appliance is formed in which the operator can use effectively the long-handle pluggers made for the Electric Mallet. Ordinary socket-points can also be used in it with equal facility by means of the proper socket-handles (see page 37 of our latest Instrument Catalogue).

The stem is of hard rubber or vulcanite, with finger slot, stop-motion springs for holding the instrument steady, and ring for the support of the Mallet.

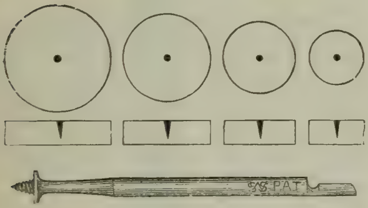
The No. 2 Mallet can be used with Hand-pieces Nos. 4, 6, 7, or 8, with or without the Slip-Joint Connection, and can be operated with any of our Engines. The illustration shows the Slip-Joint Connection.

The plugger is illustrated to show the character of the instrument used in this Mallet, but it is not included in the price.

Price . . . $18.00

In ordering, state which attachment is wanted.

Moose-Hide Polishing Points.



Designed and introduced by Dr. E. Parmly Brown, for carrying pumice or other powders to clean teeth or polish fillings. A moment's use when wet causes them to conform perfectly to the surfaces to which they are applied, when they become like a brush, passing readily between the teeth.

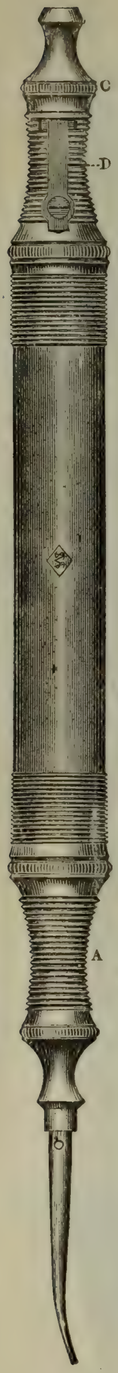
Their extreme toughness gives them a firm hold on the mandrel. They can be used on any screw-mandrel, but a medium-sized screw and a medium length of mandrel as shown in cut (our Mandrel No. 301¼) are recommended by Dr. Brown as most satisfactory. A thimbleful of pumice-powder should be mixed with water in a small dish, and into this the Point should be dipped from time to time. A fresh Point should, of course, be used for every case.

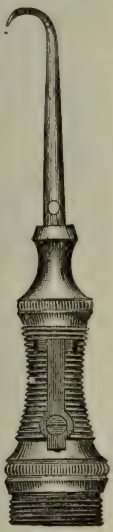
Put up in boxes containing Fifty Points, assorted sizes.

Price . . . . . per box 50 cents.

THE ABBOTT AUTOMATIC MALLET.

Patented in Great Britain and United States,
August 16, 1887.





Two of the most valuable features of the Abbott Mallet are: 1. The blow is always uniformly dead. 2. The force necessary to produce the blow is very little. Consequently the strength and time of the operator are conserved by its use.

It was designed especially to avoid the defects of other appliances of its class. It is simple in construction, and combines with the usual direct blow a back-action movement, actuated by the same mechanism, so that with it gold can be packed into cavities in almost any position in the mouth.

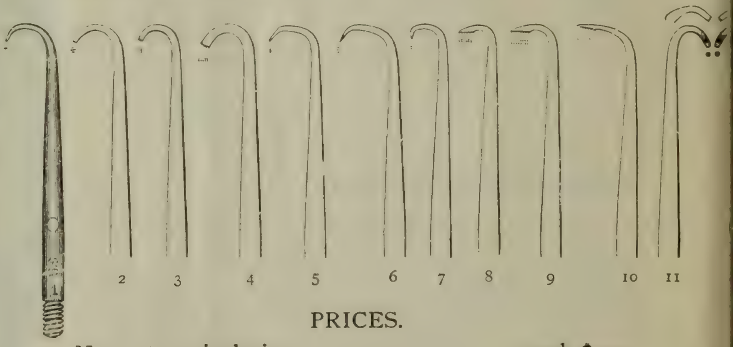
The working parts—pivotal latch, tripping mechanism, hammer, and spring—are entirely free from the case, being carried upon a spindle which passes centrally through it. This plan of construction avoids friction. Each end of the spindle is socketed for the reception of the plugger points, one end giving the direct push or thrust-blow, the other the pull or back-blow.

The Mallet combines simplicity of construction with easy, effective operation.

All the parts liable to wear are made of hardened steel, and the instrument throughout is constructed in the best manner.

For the direct blow Cone-socket, Snow & Lewis, or Salmon points may be used, as the Mallet is made with either of the sockets necessary. **Those who wish the Salmon socket will please so specify in ordering, as otherwise we always send the Mallet with Socket for Cone-Socket and Snow & Lewis points.** For the back-action blow, Dr. Abbott has devised the set of points shown below. It is believed they will cover all requirements.

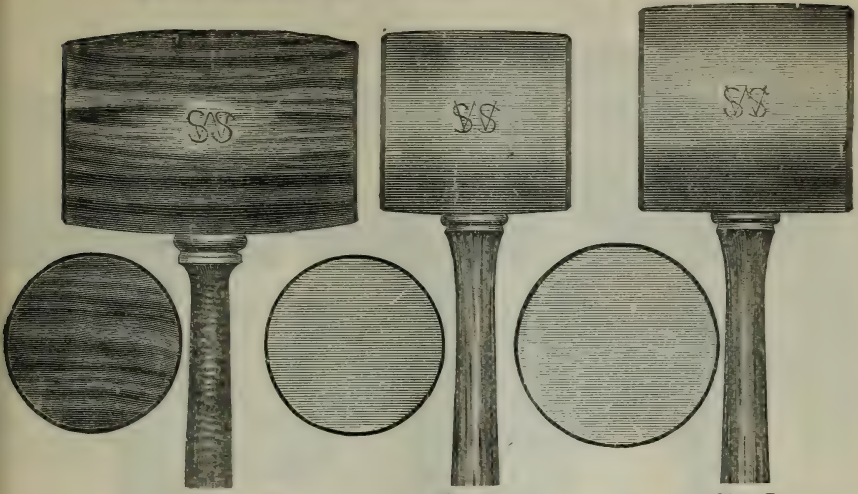
Price, Nickel-plated	$9.00



PRICES.

Nos. 1 to 7 inclusive	each	$0.40
" 8 to 12 "	"	.50
Set of 12 Points		5.25

PLUGGING MALLETS.



No. 1.

No. 2.

No. 3.

Lignum-Vitæ or Iron-Wood Head.

Rosewood Handle.

Length, 10½ inches.

Price . . each 30 cts.

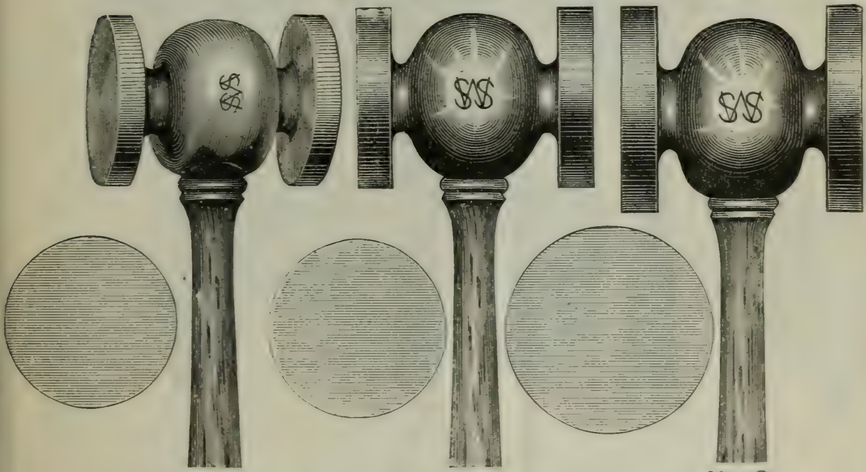
PATENT METAL HEADS.

(Silver-plated.)

Hickory Handles. Weight, 4½ and 6½ ozs. Length, 6¾ and 7¼ inches.

Price . . . . each $1.25

FROM DESIGN BY DR. A. B. ROBBINS.



No. 4.
Length, 6½ inches.

No. 5.
Length, 6 inches.

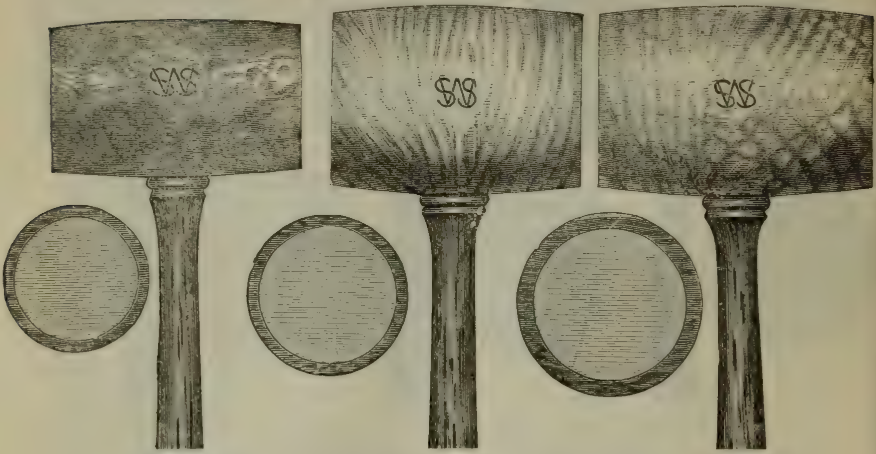
No. 6.
Length, 7¼ inches.

Heads made of Soft Steel. Handles of Heart-Hickory. The best Live-Blow Mallet in the market.

Price . . . . each $1.50

PLUGGING MALLETS.

INVENTION OF DR. CHAS. R. BUTLER.



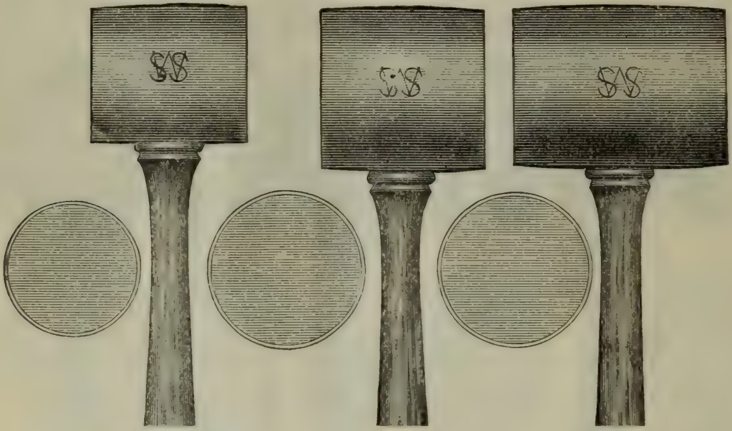
No. 7.
Length, 6½ inches.

No. 8.
Length, 7 inches.

No. 9.
Length, 7¼ inches.

The outer casings are made of thoroughly-seasoned Laurel or Brier Root; the fillings of Composition Metal, and the Handles of Heart-Hickory.

Price . . . . each $1.50



No. 10.
Length, 6¼ inches.

No. 11.
Length, 6½ inches.

No. 12.
Length, 6¾ inches.

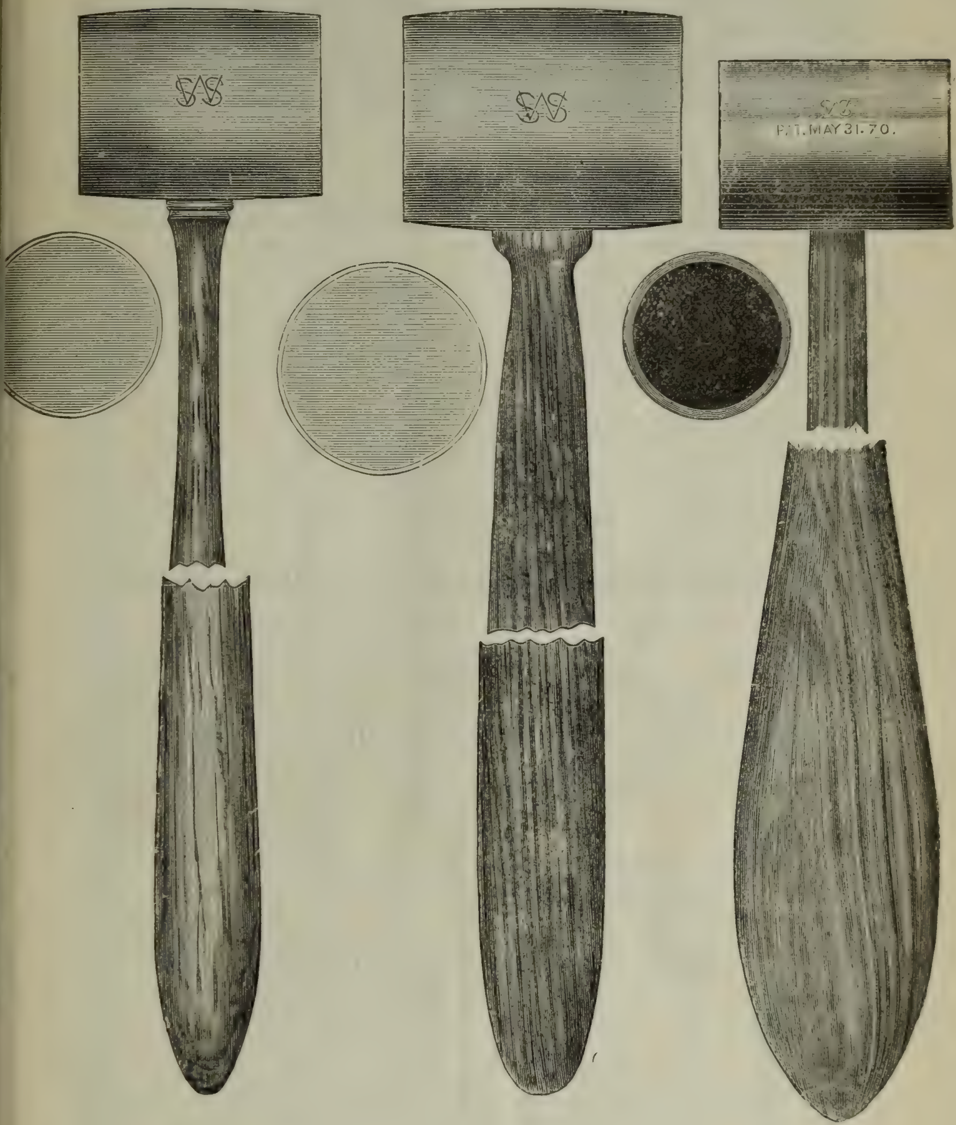
DEAD-BLOW METAL-CASE MALLET.

Nickel-plated. Heart-Hickory Handles. Weights, 2, 3, and 4 ounces respectively.

PRICES.

Nos. 10 and 11	each $1.50
No. 12	" 2.00

PLUGGING MALLETS.


PAT. MAY 31. 70.

No. 13.
Length, 7 inches.
Dead-Blow
Metal-Case Mallet.

Nickel-plated. Heart-Hickory Handle. Weight 6 ozs.

Price . . . each $2.00

No. 14.
Length, 7½ inches.
Dr. Corydon Palmer's
Metal-Case Mallet.

Nickel-plated. Rosewood Handle. Weight, 6 ozs.

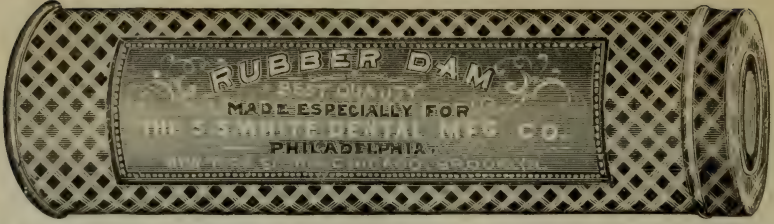
Price . . each $2.50

No. 15.
Length, 7 inches.
Dr. D. R. Jennings's
Metal-Case Mallet.

Faces covered with leather made very hard. Nickel-plated. Hard Hickory Handle. (Stained.)

Price . . each $2.00

ECONOMY IN RUBBER-DAM.



Everybody knows that free atmosphere and light are the worst foes of Rubber-Dam. Given fine quality Rubber-Dam, guard it from heat, light, and air, and trouble over "rotten" rubber will be reduced to the minimum.

The Dam we sell is the best on the market, and in the (almost) air-tight decorated tin can here offered, the dentist has a perfect protection against its enemies Then, again, the form in which it is put up—a long, narrow strip or roll—saves time and rubber. A snip of the shears, and just what is needed is ready for use, while the remainder goes back into its can until wanted.

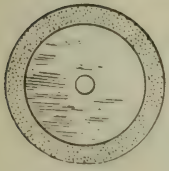
Two sizes of cans are used, yard and half-yard. The yard can contains a roll seven inches wide and five yards long; the half-yard, half the length of the same width. That is, equal to a yard or a half-yard respectively of our regular 35-inch wide Rubber-Dam, and of the same quality.

PRICES.

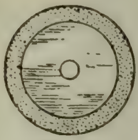
Roll Rubber-Dam, Thin, per yard Can	$1.00
" " " " " half yard Can. . . .	.50
" " " Medium, per yard Can	1.50
" " " " " half yard Can . . .	.75
" " " Thick, per yard Can	2.00
" " " " " half-yard Can . . .	1.00

THICKENED-RIM SAND-PAPER DISKS.

Patented July 2, 1878; August 5, 1884, by J. W. SMITH, D.M.D.



No. 1.



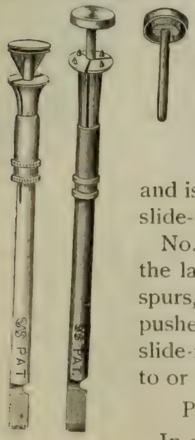
No. 2.

The center is of stiff paper, well shellacked, and coated on the back with an anti-friction preparation, while upon the face is cemented a ring of sand-paper. They will be found very convenient for removing superficial decay and finishing fillings near the gum-margin, or for contour work. Numerous testimonials have been received as to their efficiency.

Can be used on Mandrels Nos. 310, 311, 312, 313, and 315.

Put up in boxes containing 400 Disks, assorted grits.

Price of either size, No. 1 or No. 2 . . . . per box $1.00



311 312

Paper-Disk Mandrels Nos. 311 and 312.

No. 311. A feathered pin passes through the paper disk, centering it so that no time is lost in adjustment, and is clamped firmly in the split head of the Mandrel by the slide-ring.

No. 312 (patented Feb. 9, 1886). This Mandrel—invented by the late Dr. J. W. Smith—has on the face of its split head four spurs, which penetrate the disk when the recessed cap-pin is pushed against it, firmly clamping it in the Mandrel by the slide-ring. Paper, felt, or rubber disks may be quickly attached to or detached from this Mandrel.

Price of either . . . . . . 50 cents.

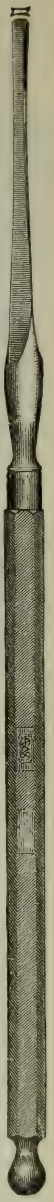
In ordering, specify the Hand-piece used.

FIXED-BLADE SEPARATOR.

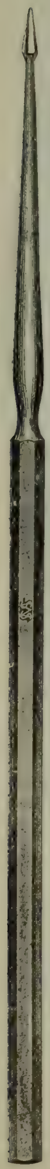
Devised by Dr. Gordon White.

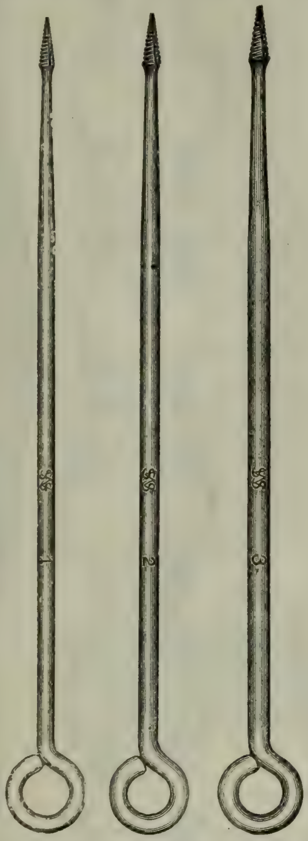
For immediately separating teeth, whether for operations or for thorough examination. It is manipulated by forcing the thin portion of the blade between the teeth to be separated, then pulling outward slowly and firmly, with a little swaying motion, until the proper space is obtained. The force so applied tends to spread the teeth outwardly, the reverse of the keystone action of the ordinary wedge, and thus a wider space is very easily obtained. Dr. White describes his method of using it in the "Hints and Queries," DENTAL COSMOS, June, 1889.

Price, Nickel-plated . . . . 75 cents.



MORRISON REAMER AND SCREW-PORTES.





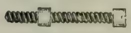
The Reamer is used to enlarge the openings into the canals of badly decayed roots to permit the entrance of the Screw-Porte for their extraction. Three sizes of the Screw-Portes are made, to suit differences in roots. The Reamer is made only on Octagon Handle.

Not kept in stock for Cone-Socket Handles.

PRICES.

Reamer, Nickel-plated, each 50 cts.
Screw-Portes, Nickel-plated . each 50 "

REGULATING SCREW AND NUT.



In the construction of gold or other metallic regulating fixtures it is often desired to pass a Headed Screw through an angle piece, and by turning the screw pull on the Nut which has been soldered to a strap embracing several teeth, or to a collar surrounding a single tooth to be moved.

We illustrate such a Headed Screw and Nut made of crown-metal (94 per cent. platinum), which we supply in two sizes, A and B, of the How screw style of thread.

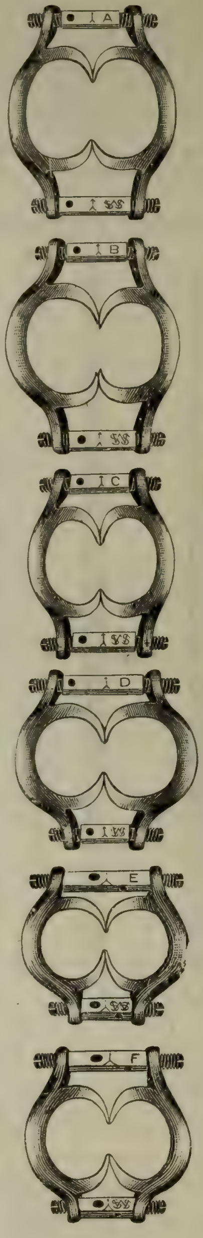
PRICES.

Regulating Screw A, without Nut		$1.00
" " B, " "		1.10
Extra Nuts for either size	each	.40

PERRY'S TWO-BAR SEPARATORS.

Invented by Dr. Safford G. Perry. Patented Sept. 8, 1874; July 5, 1887.

The principal advantages found in Dr. Perry's Two-Bar Separators are smaller size, more rapid adjustment, and the increased facilities which they afford to the operator, their shape permitting the teeth to which they are applied to be approached readily from either side, while the light can be thrown unobstructed upon every part of the separated surfaces. Little arrows stamped upon the bars indicate the direction in which they are to be turned to spread the Separators. The Wrench for operating them is double-end, one end straight and the other bent at an angle, to give greater facility for turning the bars in different positions.



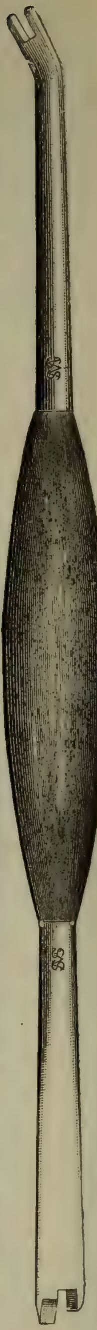


FIG. 1.

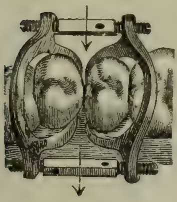


FIG. 2.

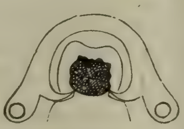


Fig. 1 shows the Separator applied. When there is a tendency, as with teeth of narrow necks, to slip toward the gum, wood or gutta-percha props are to be put on the adjacent teeth under the bows to prevent them from tilting and to keep the points from being forced under the gums while the teeth are being separated.

Fig. 2 shows the position of the bars—out of the way of the operator.

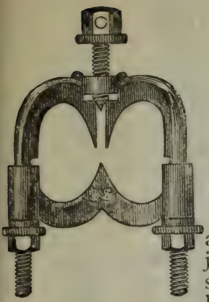
The set originally consisted of four sizes, A, B, C, D. A, for separating molars; B, for separating molars from bicuspids; C, for the bicuspids; D, for the front teeth. Experience having demonstrated the need of two additional sizes, they are now made from Dr. Perry's patterns: E, for separating the first bicuspid from the cuspid; F, for incisors too small for D.

For full description and methods of use, see DENTAL COSMOS, August, 1885, page 449, and April, 1888, page 217.

PRICES.

Two-Bar Separators	each	$3.50
Wrench for same		1.25

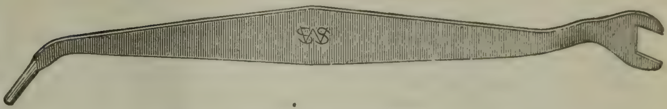
These improved Separators, of course, supersede the old-style single-bar, which will, however, be supplied on special order.



UNIVERSAL SEPARATOR.

Invented by Dr. H. A. PARR.

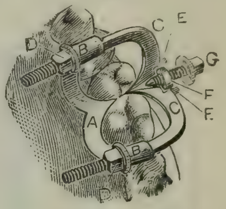
Patented September 8, 1874; October 5, 1886.



Dr. Parr claims that this Separator is universal in application and adjustment between teeth of all denominations in either jaw; it is therefore manufactured in a single form of the exact size of the cut. The mode of its application to teeth of all kinds is made obvious by the illustration, Fig. 1. The nuts D D can be moved with the thumb and finger, or the wrench, as required to force the wedging points between the teeth; and as the nuts move independently of each other, the arms can be more or less drawn to adapt the pressure to the varying curves of the teeth. Greater separating force will be obtained by turning the screw G.

With this device teeth may be separated, and, if necessary, be held by wedges in the positions to which the Separator has forced them. It should prove of no small advantage that a single Separator will thus render practical service in every part of the mouth where two teeth are to be forced and held apart from any dental operation. For further description, see report of First District Dental Society of New York in Dental Cosmos for August, 1886, page 509.

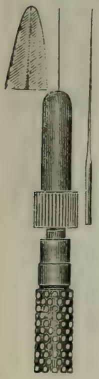
FIG. 1.

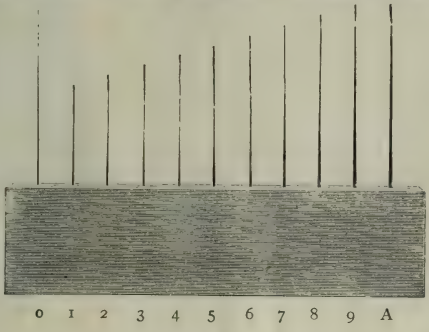


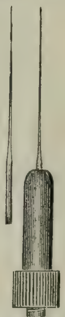
PRICES.

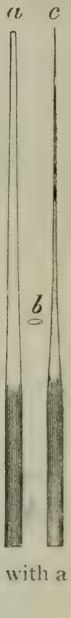
Universal Separator with Wrench	$7.50
Wrench separately	.25

How's Root-Canal Probe, Pluggers, Dresser, and Gauge Chuck.









The probe No. 0 is round, spring temper and very fine. The Pluggers Nos. 1 to 9 are oval as seen in the magnified illustrations, *a* showing the face, *b* the cross-section, and *c* the edge. They are made of polished spring-tempered steel extremely thin, with squared ends to carry the filling-material—shreds of tin-foil— to the apices of the roots, as described by Dr. How in the October (1890) Dental Cosmos, page 763. The dresser, A, is of like form, but made of iridio-platinum for dressing roots or sulci with acids on cotton, which is readily wrapped on the flattened point. The chuck is also a gauge, and measures the exact depth of the canal while holding the plugger with a firm grip.

PRICES.

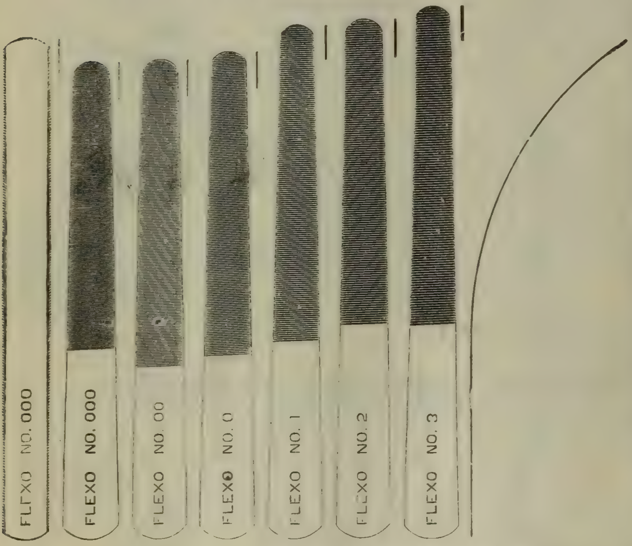
Nos. 0 to 9	each	$0.25
A	"	.50
Gauge Chuck	"	1.25
The Set		4.00

"Flexo" Files, Saws, and Strips.

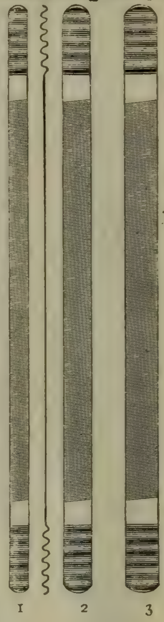
Patented December 1, 1885.

The "Flexo" appliances are actual demonstrations of the idea that hard steel can be made flexible. These are their advantages: They can be bent to adapt them to the shape of the tooth. There is practically no breakage, hence they can be used until worn out. They are not absolutely unbreakable,—even tough steel has its limitations. They cannot be kinked at a right angle, or wrapped around a tooth, but by a little manipulation they can be adapted to the form required. They cut rapidly and smoothly without dragging. Used wet, they clear themselves.

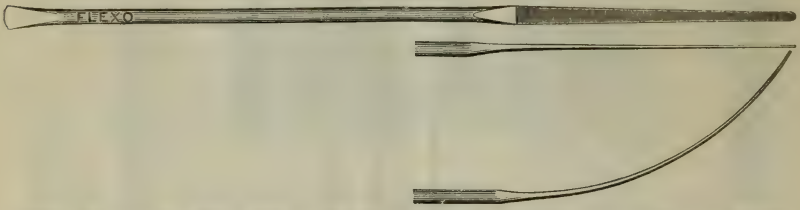
SEPARATING SAWS AND FILES.



Finishing Strips.



PLUG-FINISHING FILE.



The Separating Files cut on both edges and one side; the other side safe. Six sizes, Nos. 000 to 3, push cut; Nos. 000 to 1 are also made draw cut. Put up in dozen packages, each number separately, and assorted.

The Saws are only made No. 000, with both sides safe.

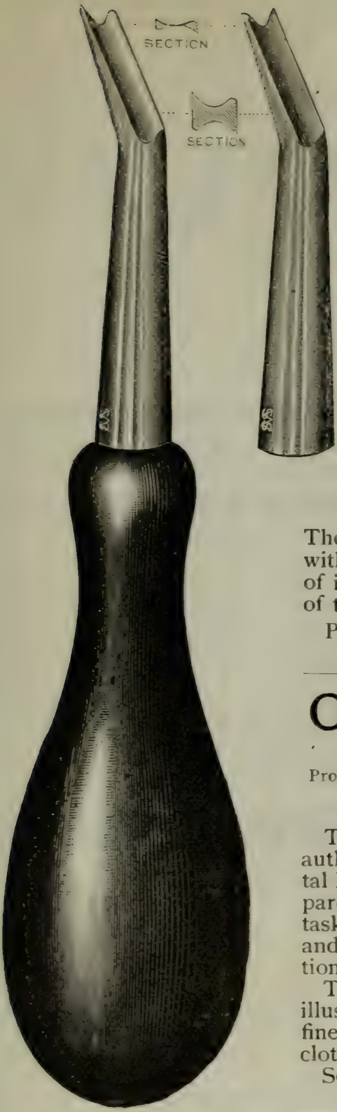
The Plug-Finishing Files (suggested by Dr. H. F. Libbey) are made thin and narrow, tapering to a very thin point.

The Finishing Strips are made in three sizes, with crimped finger-holds.

PRICES.

Separating Files	per doz.	$3.00
Separating Saws	"	3.00
Plug-Finishing Files	"	3.00
Finishing Strips	"	3.00

THE S. S. WHITE DENTAL MFG. CO., Sole Agent.



Right and Left Elevators.

Designed by DR. J. F. CANINE.

A pair of Right and Left Elevators for the extraction of wisdom-teeth in either jaw. The cross-section shows the peculiar shape of the double-groove blades, with one rounded and one sharp edge, these being reversed on the opposite side. The blade is forced from the buccal side as a wedge between the wisdom-tooth and the molar next to it, with the lower sharp edge presenting toward the neck of the wisdom-tooth and the upper toward the crown of the adjoining tooth. Twisting the handle slightly in the proper direction engages the blade under the border of enamel of the wisdom-tooth, which is then readily elevated out of its socket in the direction of the curvature of its roots, the adjoining tooth serving as a fulcrum. The insertion of the instrument is accomplished with little inconvenience to the patient because of its wedge-shape and the separator-like edge of the point.

Price, Round Handle . .	each	$1.75
" Octagon Ebony Handle	"	2.25

ORTHODONTIA:

By S. H. GUILFORD, A.M., D.D.S., Ph.D.,

Professor of Operative and Prosthetic Dentistry in the Philadelphia Dental College;
Author of "Nitrous Oxide," etc.

This volume is one of the series of text-books authorized by the National Association of Dental Faculties. Dr. Guilford was selected to prepare it because of his well-known fitness for the task. The completed work has been accepted, and indorsed and recommended by the association.

The book contains nearly 200 pages, with 128 illustrations, many of which are new, printed on fine toned heavy paper, and neatly bound in cloth.

Sent by mail on receipt of price.

Price $1.75

THE S. S. WHITE DENTAL MFG. CO.,

SOLE AGENT.

A NEW ANESTHETIC MANUAL.

NITROUS OXIDE:

Its Properties, Method of Administration, and Effects.

BY S. H. GUILFORD, A.M., D.D.S.,

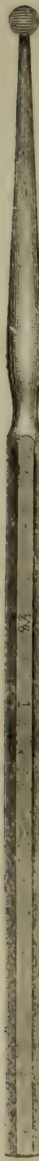
Professor of Operative and Prosthetic Dentistry at the Philadelphia Dental College.

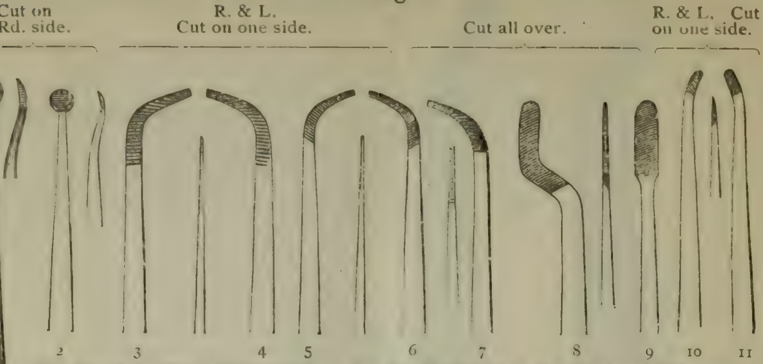
Sent by mail on receipt of price.

Price $1.00

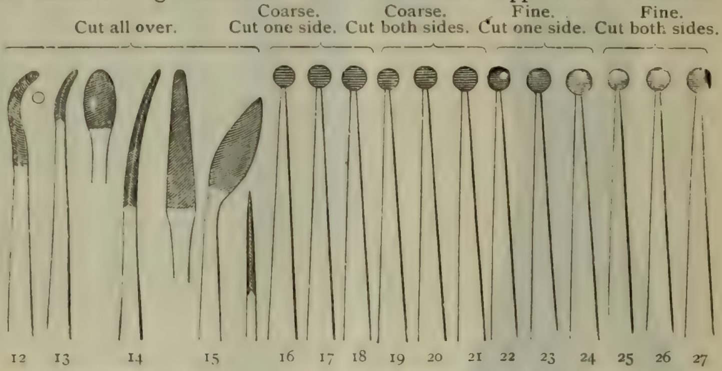
PLUG TRIMMERS AND PLUG-FINISHING FILES.

Dr. F. Searle's Plug Trimmers

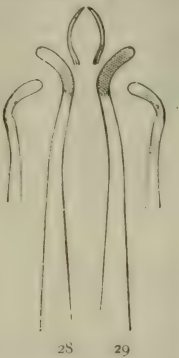




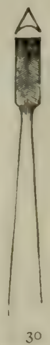
Dr. Searle's Plug Trimmers. Dr. D. D. Smith's Approximal Trimmers.



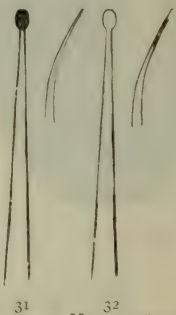
Right and Left Approximal Trimmers
Patented March 13, 1883.



Dr. H. Weston's Two-Faced Safe-sided File.



Dr. M. L. Rhein's Approximal Trimmers.

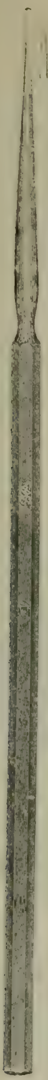


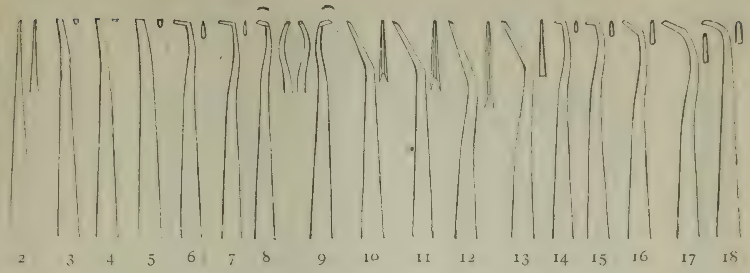
No. 31 cut on inside.
No. 32 on outside.

PRICES.

Octagon Handles, Nickel-plated.		Cone-Socket Points.	
Nos. 1 to 6	each $0.40	Nos. 1 to 6	each $0.25
“ 7 “ 9	“ .50	“ 7 “ 9	“ .35
“ 10 and 11	“ .40	“ 10 and 11	“ .25
“ 12 to 18	“ .50	“ 12 to 18	“ .35
“ 19 “ 24	“ .60	“ 19 “ 24	“ .45
“ 25 “ 27	“ .75	“ 25 “ 27	“ .60
“ 28 and 29	“ .50	“ 28 and 28	“ .35
No. 30	“ .75	No. 30	“ .60
Nos. 31 and 32	“ .60	Nos. 31 and 32	“ .45

Dr. W. C. Head's Approximal-Surface Instruments.





Intended chiefly for use in preparing cavities between the upper front teeth, working from underneath, but also useful on bicuspids where compound cavities are to be formed for contour fillings.

Special attention is directed to their fine working qualities. Each point has been carefully designed, shaped, and tempered in accordance with the directions given by Dr. Head, and the sample set submitted to and fully approved by him. The high temper given them preserves sharp, keen edges. *They cut rapidly with comparatively light pressure.*

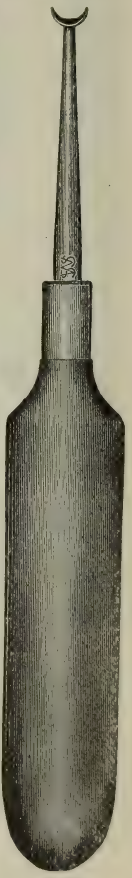
Nos. 1 and 2 are retaining-point drills; Nos. 3, 4, 5, enamel gouges; Nos. 6, 7, hatchets; Nos. 8, 9, groove-cutters for palatal edge of cavities in incisors or cuspids; Nos. 10, 11, 12, 13, chisel-hoes; Nos. 14, 15, 16, 17, 18, groove-cutting hoes.

Made only on Octagon Steel Handles, fine-blued.

PRICES.

Nos. 1 and 2	each	$0.30
" 3 to 18	"	.50

GUM RETRACTOR.



Suggestion of Dr. T. F. Chupein.

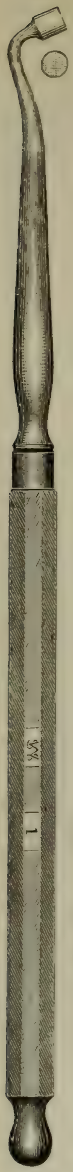
Designed to hold back the gum, or the rubber-dam, while filling those very troublesome cavities which extend under the gum on the labial surfaces of the anterior teeth.

The Retractor is to be held in the left hand of the operator, or by the assistant, and is so nicely shaped that its hold on the tooth-neck is close, to exclude moisture, and secure against slipping.

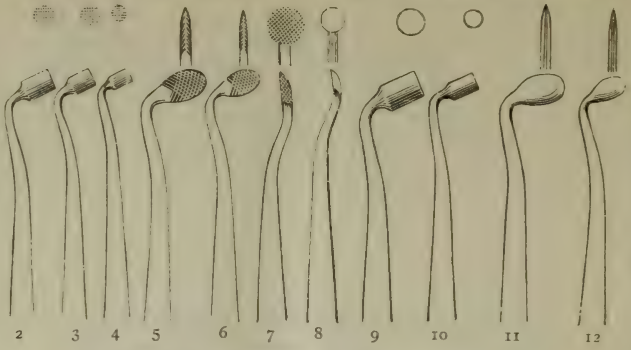
Ebony Handles.

Price	each 75 cents.

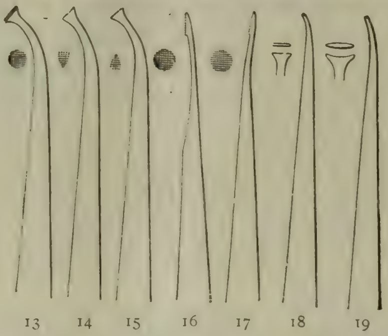
Amalgam, Gutta-Percha, and Plastic Filling Instruments.



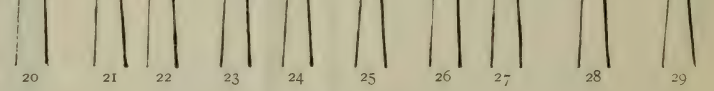
Dr. B. F. Arrington's Amalgam Pluggers and Burnishers.



WESTON'S AMALGAM INSTRUMENTS.



DR. T. G. LEWIS'S AMALGAM INSTRUMENTS.



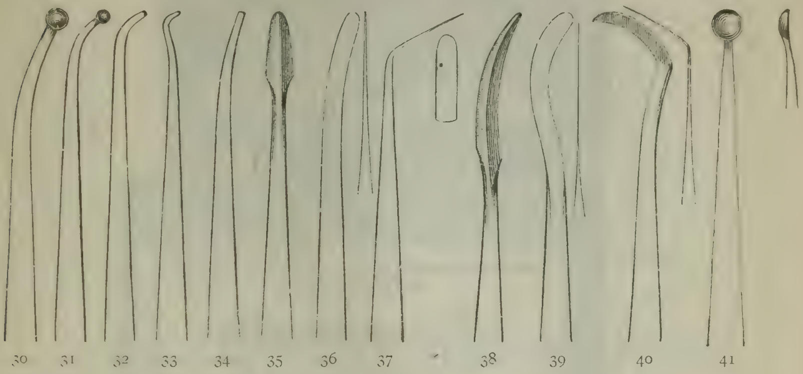
PRICES.

Nos.	File-cut Handles, Nickel-plated.		Nos.	Cone-Socket Points.	
Nos.	1 to 7	each 60 cents.	Nos.	1 to 7	each 45 cents.
"	8 to 12	" 50 "	"	8 to 12	" 35 "
"	13 to 17	" 60 "	"	13 to 17	" 45 "
"	18 and 19	" 50 "	"	18 and 19	" 35 "
"	20 to 22	" 60 "	"	20 to 22	" 45 "
"	23 to 28	" 50 "	"	23 to 28	" 35 "
"	29	" 60 "	"	29	" 45 "

Amalgam, Gutta-Percha, and Plastic Filling Instruments.

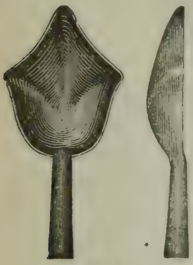
Dr. J. Foster Flagg's Amalgam and Zinc Filling Instruments.

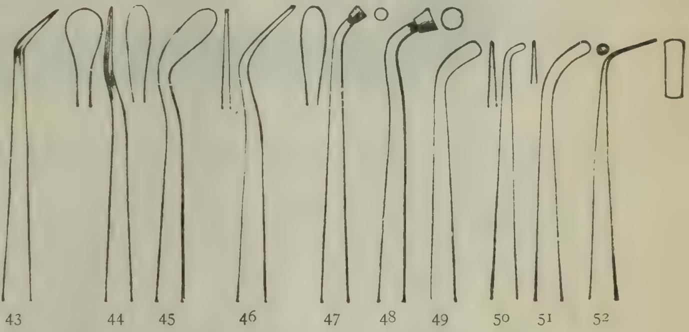
Dr. James B. Willmott's.



Gutta-Percha Instruments.

Dr. E. R. Mullett's Amalgam Director





PRICES.

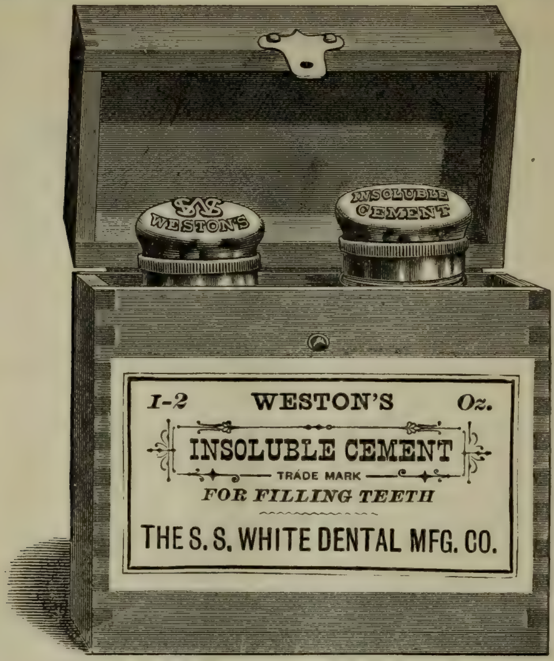
File-Cut Handles, Nickel-plated.

Nos. 30 and 31	each 50 cents.
" 32 to 34	" 40 "
No. 35	" 50 "
" 36	" 40 "
Nos. 37 to 41	" 50 "
No. 42 on C. S. Handle No. 1 or 2	" 60 "
No. 42 on C. S. Handle No. 10	" 75 "
Nos. 43 to 48 (Woodson's) Double-End	" 75 "
Nos. 49 to 52	" 50 "

Cone-Socket Points.

Nos. 30 and 31	each 35 cents.
" 32 to 34	" 25 "
No. 35	" 35 "
" 36	" 25 "
Nos. 37 to 41	" 35 "
No. 42	" 50 "
Nos. 43 to 52	" 35 "

WESTON'S INSOLUBLE CEMENT.



One-Color Case. Actual Size.

We have adopted a neat wood case for the Weston Insoluble Cement when put up in single-color packages. It adds nothing to the value of the preparation, but it is an advance in neatness and convenience, and the bottles contain more than the old style. So far as the Cement itself is concerned, it stands in no need of "improvement" to make it valuable. Through the long years it has been before the profession, its sales have steadily increased, and many who began to fill teeth with it experimentally when it was first put forth, continue to use it in their daily practice, and consider it as much a necessity as their engines or chairs. It saves their patients' teeth.

As to the special value of Weston's Insoluble Cement: Its hydraulic properties are well known—the very best results are obtained when the filling is at once submerged for from three to five minutes in water as hot as the patient can bear. It is uniform in quality, mixes easily, hardens satisfactorily, —it can be hardened in two minutes,—and lasts indefinitely. The best proof of its usefulness is that with comparatively little advertising, it probably outsells any other cement filling-material before the dental profession.

Put up in half-ounce single-color, and four-color cases. The four-color case contains four quarter-ounce bottles, No. 1 White, No. 2 Yellow, No. 3 Blue, and No. 4 Brown. With these the dentist can with a little practice match closely any shade of tooth desired. The fluid bottle contains one ounce. The stem of the ground-glass stopper is extended to form a convenient dropper.

Follow directions in mixing. It may be assumed that the manufacturer of a preparation, who of all men has most at stake in its success or failure, will issue only such instructions as may be relied upon to give the best results.

Price, Four-Color Case	$2.25
" One-Color Package	1.50

Gutta-Percha Filling-Materials.

"Gutta-percha, properly used, is the most permanent filling-material we possess." That is the way the "New Departurist" creed expressed its founders' appreciation of gutta-percha many years ago, even with the qualification, a bold declaration; but there is no question that, "properly used," gutta-percha is one of the most valuable filling-materials at the service of the dentist. How many years it has been successfully used in those cavities in those teeth where its qualities are available, the memory of man hardly runneth to the contrary. It has no place on the grinding-surfaces, but where it is not exposed to the wear and tear of mastication, in the frail teeth which crumble away from a gold filling, the non-conducting, non-escharotic properties of gutta-percha make it invaluable.

"HILL'S STOPPING."

"Hill's Stopping"—still with the old-fashioned, long-tabooed (in this country at least) name—has been longer before the profession than any other gutta-percha preparation for filling teeth. From about 1855 on it has made and held its reputation. Other gutta-percha preparations have come up and made their place in the world, but they have not lessened the esteem felt by many operators for "Hill's Stopping," which still has a large sale.

Put up in ounce, half-ounce, quarter-ounce, one-tenth ounce, and one-twentieth ounce envelopes.

Price . . . per oz. $5.00

HALF-OUNCE.

TRADE MARK.

HILL'S
STOPPING.
AHill D.D.S.

Registered May 11, 1875.

THE S. S. WHITE DENTAL MFG. CO.
SOLE AGENT,
Philad'a. New York, Boston, Chicago, Brooklyn.

BEWARE OF COUNTERFEITS!
The genuine is sold (in any quantity) in Sealed Packages only, bearing the above TRADE MARK.

"Premium Gutta-Percha Stopping."

This preparation possesses all the desirable characteristics which inhere in the material, *per se*, as its non-escharotic and non-conducting qualities, its adaptability to use in cavities with frail walls, or in sensitive teeth, because of the slight force required to pack it, the readiness with which it can be removed when necessary, etc. It has also several special advantages which have obtained for it wide indorsement. It is thoroughly plastic, but not sticky; it does not work "salvy," and by sticking to the instrument drag itself from the position in which it has been placed; it hardens promptly, and it is nearly the average color of the teeth.

Put up in half-ounce boxes, either stick or cake form.

Price . . . . per oz. $2.00

GUTTA-PERCHA PELLETS.

A convenient form of Gutta-percha for filling that has had a steady sale since its introduction years ago, and can be relied upon as a good, carefully compounded preparation. Put up in ounce, half-ounce, quarter-ounce, one-tenth ounce, and one-twentieth ounce boxes.

Price . . . . per oz. $2.00

DRESSING SEAL.

FOR

TEMPORARILY CLOSING CAVITIES, AS FOR MEDICATION.

We have recently introduced marked improvements in this preparation which will unquestionably enhance its value and usefulness. The sticks are made much thinner, so that the ends can be inserted into almost any size cavity, except the pin-head sort, where the use of this material is never necessary. Put up in ounce boxes of one dozen sticks, of which one-third are pink and two-thirds white.

Price . . . . per box 50 cents.

Dr. S. Eldred Gilbert's Temporary Stopping.

For the retention of medicaments used in the treatment of teeth, and the filling of cavities temporarily; also for non-conducting layers in deep cavities, and for filling pulp-canals. Put up in ounce boxes.

Price . . . . per box 50 cents.

ROOT-CANAL POINTS.

WOOD, METAL, AND GUTTA-PERCHA.

Three of the most popular and most widely used materials for filling root-canals are Wood, Metal, and Gutta-percha Points. All of them have been used for years, each has its advocates who claim better success in their hands with the particular point they use than with anything else, and any one of them properly applied will unquestionably make a good root-filling. We supply them all.

GUTTA-PERCHA CANAL POINTS.

Suggested by DR. S. G. PERRY.

Made of "Premium" Gutta-percha. Put up in boxes of 150 Points.

Price . . . . per box 50 cents.

WOOD CANAL POINTS.

Put up in boxes of 100 Points.

Price . . . . per box 50 cents.

METAL CANAL POINTS.

Made of lead and tin, and put up in boxes of 50 and 100 Points, of either kind but not assorted.

Price, either Lead or Tin, per box of 100 . . . . . $1.00
" " " " " " " " 50 50

Smith's Adamantine Phosphate Cement.

INSOLUBLE.

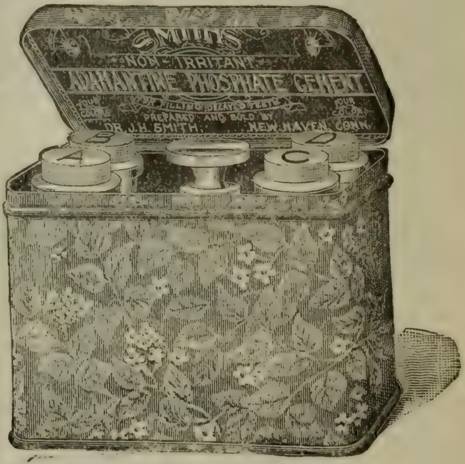
TWO COLORS.

Price - - - - $1.00

Also in Neat Cases, as shown in cut, containing four colors of Powder and one bottle of Liquid, glass-stoppered.

A, White; B, Brown; C, Yellow; D, Bluish.

Price - - - - $2.00



Smith's Oxychloride of Zinc.

PRICES.

Plain Form, one ounce . . . . each $1.00
Neat Cases, as shown in cut, containing four colors of Powder and one bottle of Liquid, glass-stoppered . . . . . " 2.00

A, White; B, Brown; C, Yellow; D, Bluish.

Local Anesthesia by Chloride of Ethyl.

Pure Chloride of Ethyl is not a secret formula or a patented nostrum. It is a known chemical compound whose components and proportions and general properties are given in the books and are therefore at the command of all men. Its refrigerating property is the active agent in the production of the local anesthesia which follows its application. All that there is in the invention of M. Monnet is the simple, practical method of application. A plain glass tube, with one end elongated to capillary dimensions, and hermetically sealed, serves to confine the chloride, to carry it to the operator, and to apply it to the part to be anesthetized. No other apparatus is required, not even a hypodermic needle.

Two or three points should be borne in mind in its use: The part to be anesthetized should be thoroughly dried and anointed with glycerin; surrounding tissues should be protected from the effect of the drug by being covered with linen or cotton wool; and last, but not least, the tube should be held at some distance from the part against which the spray is to be projected, say from eight to twelve, or even twenty inches. In operations in the mouth the patient should be directed to breathe through the nose.

If these precautions are taken, the production of perfect anesthesia of the part is almost certain, and without fear of after-effects, as the tissue soon returns to its normal condition.

Supplied in curved or straight tubes. Put up in cases of five and ten tubes.

The quantity in each tube ought to be sufficient, as a rule, for the painless extraction of several teeth. After using a portion, the remainder can be preserved by covering the broken end of the tube with a rubber cap, secured by a rubber band passed over it and around the tube lengthwise, and storing in a cool place. One gentleman who has used Chloride of Ethyl successfully finds the best way to preserve the remainder after using a portion is to punch a hole in a rubber cork, force in the broken end of the tube, and put away in a glass of water. The tubes should always be kept at a distance from an open fire or gaslight.

Price, 5-Tube Case (postage, extra, 26 cents)	$2.00
" 10- " " (" " 36 ")	4.00
" Single Tube for Trial (postage, extra, 10 cents)	.50

THE S. S. WHITE DENTAL MFG. CO.,

SOLE AGENT FOR THE UNITED STATES.

DR. DARBY'S SPECIALTIES.

DENTAL CAPSICUM PLASTERS, well known and used throughout the world. $1.00 per box.

HARD BUFF POLISHERS, for the Engine. Great for polishing fillings and discolored enamel. 50 cents per 100.

PAPER POINTS, for drying pulp-canals. Speak for themselves. Very practical. 25 cents per 100.

Manufactured by FRANK B. DARBY, D.D.S., Elmira, N. Y.

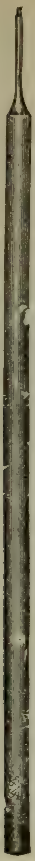
Sedative Antiseptic Dressing.

For dental uses the new antiseptic Aristol has received the sanction of eminent members of the profession, and we now supply it in half-ounce colored bottles with oil of cassia as an adjuvant, according to Dr. E. C. Kirk's formula: Aristol, gr. vii; Oil of Cassia, ʒiii.

Price, per bottle . . . . 30 cents.

Anchor Screws and Appliances.

No. 1.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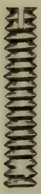
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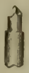
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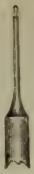
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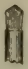
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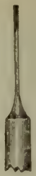
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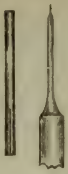
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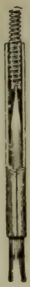
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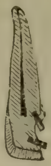
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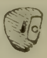
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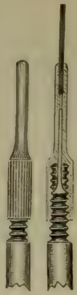

No. 7.

Cut No. 1 shows the size of the 18-carat Gold Anchor Screw.

No. 2. Iridio-Platinum Anchor Screw, same diameter, but longer than No. 1.

"A." Anchor Screw magnified to show thread and slot.

No. 3. The Starting or Center Drill will form a pit at the exact point desired; but if this point be not at first obtained, the pit center may be moved laterally while the drill is revolving.

"B." Point of Center Drill magnified.

No. 4. Limit or Anchor Drill; will bore only to the depth determined by the limit shoulder,—half the length of Screw No. 1.

"C." Point of Limit or Anchor Drill magnified.

No. 5. Screw-Tap; is probably the most perfectly formed tap of its size that has ever been put on the market, its diameter being only thirty one-thousandths (.030) of an inch.

No. 6. Screw-Driver and Sleeve which holds the screw for insertion or removal, as shown magnified at D.

No. 7. The Anchor Screw Chuck is made upon the principle of the How Screw Post Chuck, and is operated in the same way. It will drive an Anchor Screw or a section of Anchor Screw Wire, but it cannot be used to back out a slotted screw as the Driver No. 6 can. Its principal use is in screwing home sections of the wire, which may be nicked at the proper point, and twisted off by turning the chuck after the wire is seated, leaving the cut-off end as an anchor.

"E" and "F" exemplify the Anchor Screw in gold contouring operations. A drilled and tapped hole to be filled with gold foil serves as a superior retaining point.

See February DENTAL COSMOS, 1887, page 92.

The Handles are made smooth to prevent a breaking twist or the stripping of the threads of dentine by excessive force in turning the tap.

PRICES.

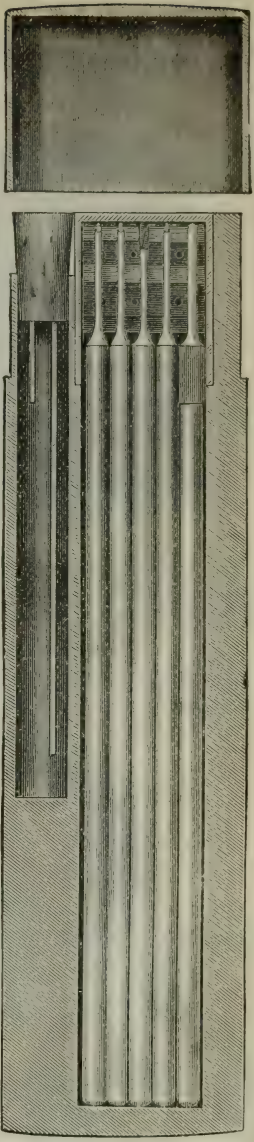
No. 1.	Gold Anchor Screws	each	$0.20
" 2.	Iridio-Platinum Anchor Screws	"	.25
" 3.	Center Drill	"	.25
" 4.	Anchor Drill	"	.25
" 5.	Anchor Tap	"	.50
" 6.	Anchor Screw-Driver and Sleeve	"	.30
" 7.	Anchor Screw Chuck	"	1.00
The set of five instruments		per set	2.25
Center Drill No. 3 and Anchor Drill No. 4 are also made for use with engine. Price		each	.25

In ordering, state for which hand-piece they are desired.

Case for Anchor Screw Appliances.

This instruments are held in a narrow compartment, at the upper end of which (under the points of the instruments) is a recess for holding the little boxes in which slotted Anchor Screws are sold. One of these with the lid removed is set into the recess. A cylindrical compartment is provided for carrying lengths of Anchor Screw wire, with a cork stopper, which not only keeps dust out but supplies a ready method of handling the wires.

Made of wood (size of cut), leather-covered, with slip-top. Can be carried in the vest pocket.



PRICE.

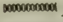
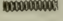
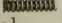
Case	$0.50
Complete as illustrated with 6 Screws (either No. 1 or 2), 2 inches Screw Wire, and set of 5 Screw Appliances	5.00

SCREW WIRE, POSTS, ETC.

SCREW WIRE.

	No.	Length.	Diam.	Threads to inch.	Price per rod.
Morrison's 12-K. Gold	1	3 in.	.052	112	$1.50
" " "	2	3 "	.042		1.20
" " "	3	3 "	.035		1.00
Talbot's 18-K. "	4	2 "	.060	54	1.30
" " "	5	2 "	.058		1.20
" " "	6	2 "	.051		.80
" " "	7	2 "	.046		.70
" " "	8	2 "	.041		.60
Anchor " "	9	2 "	030	100	1.00
" Iridio-Platinum	10	2 "	.030		1.25

SCREW-POSTS.

		No.	Length.	Diam.	Threads to inch.	Price each.
How's 14-K. Gold		AA	7/8 in.	.051	48	$0.45
" " "		A		.058		.55
" " "		B		.065		.65
" Bright-Metal		AA	7/8 "	.051	48	.15
" " "		A		.058		.15
" " "		B		.065		.15
" Crown-Metal		AA	5/8 "	.051		.50
" " "		A		.058		.60
" " "		B		.065		.70

SCREW-POSTS WITH HEADS.

			Length.	Diam.	Threads to inch.	Price each.
Bright-Metal		AA	5/8 in.	.051	48	$0.35
" "		A		.058		.35
" "		B		.065		.35

ANCHOR SCREWS.*

	Length	Diam.	Threads	Price
Gold	$\frac{1}{10}$ in.	.030	100	.20
Iridio-Platinum . .	$\frac{3}{20}$ "	.030		.25

NUTS FOR SCREW-POSTS.

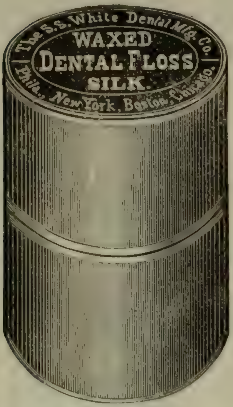
Gold, three sizes, AA, A, B, ...	each .50
Bright-Metal, three sizes, AA, A, B	" .12

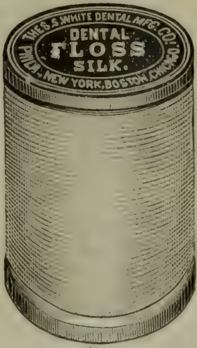
The Morrison Screw Wires are used with the taps and drills of the instruments known as the St. Louis system.

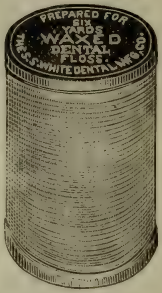
* Anchor Screws, both Gold and Iridio-Platinum, are put up in boxes of 6 screws each.

DENTAL FLOSS SILK.

PRICES REDUCED AND SIZES MULTIPLIED.


The S.S. White Dental Mfg. Co.
WAXED
DENTAL FLOSS
SILK.
Phila., New York, Boston, Chicago.


THE S.S. WHITE DENTAL MFG. CO.
DENTAL
FLOSS
SILK.
PHILA., NEW YORK, BOSTON, CHICAGO.



The growing demand for the high grade of Silk which we have so successfully handled for many years has induced us to increase the variety. Both the Plain and Waxed are now put up in

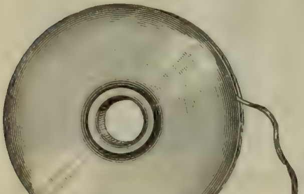
12 YARD, 24 YARD, AND 150 YARD SPOOLS.

The Large Spools (150 yards) will be found very convenient for office use. Six times as much silk on the spool before it has to be replaced.

PRICES.

		Per half-gross.	Per dozen.	Per spool.
Plain	12 yard Spools (Black Boxes)	$4.00	$0.75	$0.08
	24 " " Red "	6.25	1.35	.15
	150 " " Black "	38.25	8.00	.75
Waxed (each spool in a box)	12 yard Spools " "	6.00	1.25	.12
	24 " " Red "	9.50	2.00	.20
	150 " " Black "	45.50	9.50	.90

We also furnish the Waxed Silk in 6-yard Spools such as were originally designed for refilling our Floss Silk Holder shown below.



PRICES.

6 yard Spools	Per half-gross	$3.00
	" dozen	.60
	" spool	.06

FLOSS-SILK HOLDER.

A Holder for the pocket, made of steel, nickel-plated, carrying six yards of waxed floss silk.

Price, in three dozen lots	$7.88
" in one " "	3.00
" each	.30

COLORED LIGATURE SILK.

Suggested by Dr. LOUIS OTTOFY.

The Silk will be found useful when for the application of the rubber-dam a number of ligatures are required; the difference in color preventing confusion in their adjustment or removal, even in remote parts of the mouth.

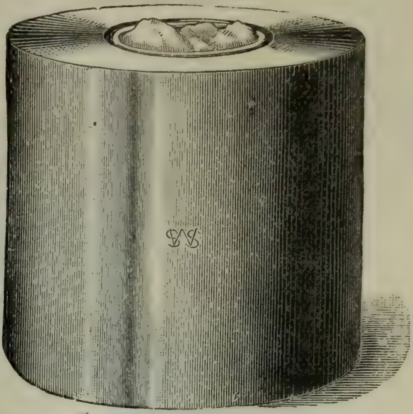
ON SPOOLS OF TWENTY YARDS EACH.

White, Gold, Pink, Blue, and Purple.

Price	per doz.	$1.75
"	" spool	.16

COTTON-HOLDER.

Pattern furnished by Dr. E. METHOT.

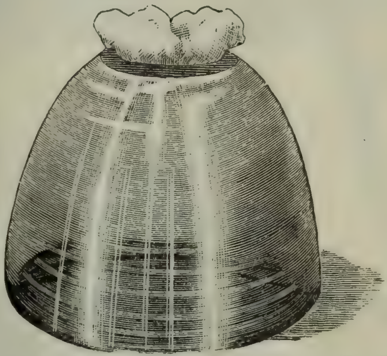


This compact, simple, and effective Cotton-Holder is made of brass, ⅛-inch thick, which gives the necessary weight without loading the base. The spring which forces up the cotton is soldered to two heavy brass disks, one of which forms the bottom of the Holder, and the other the plate on which the cotton rests. The cotton is firmly pressed against the orifice, thus being ready for use at any time.

Price, Nickel-plated . 85 cts.

GLASS COTTON-HOLDER.

Invented by Dr. E. J. THOMPSON.

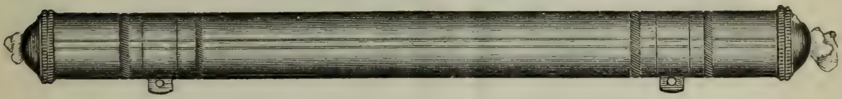


This simple, cheap, and effective Cotton-Holder is made of claret-colored glass, with an inner rim around the base, on which rests a conical spiral spring for pressing the cotton against the opening at the top. The Holder can be filled from the top without removing the spring.

Price . . . . each 35 cents.

Automatic Cotton-Holder.

Invented by Dr. A. C. RUNYAN.



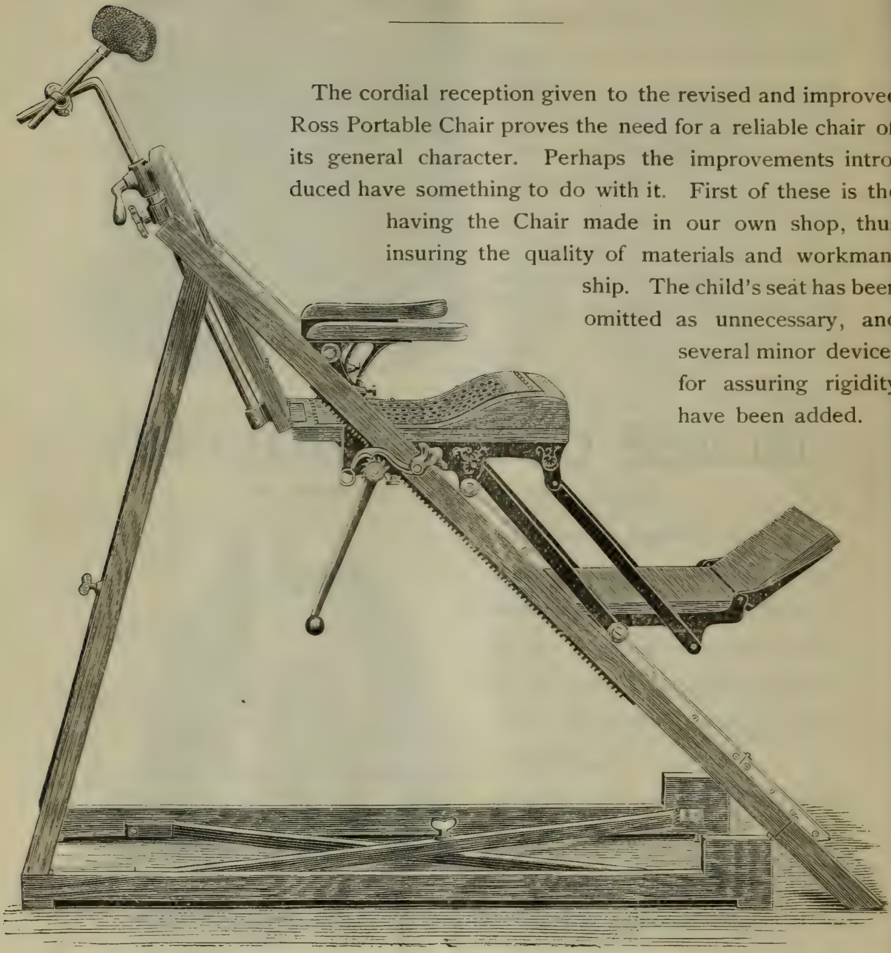
This Holder works on the same principle as the holder attached to our Holmes Table, and is similar to it except that the "Runyan" pattern is double-end while the "Holmes" is single. It can be screwed to the edge or base of a bracket-table, and one end may contain cotton while the other carries spunk or bibulous paper. Length, 12⅞ inches; diameter, 1 inch.

Price, Nickel-plated . . . . each $3.00

The Ross Portable Dental Chair.

Patented July 19, 1881; August 24, 1886.

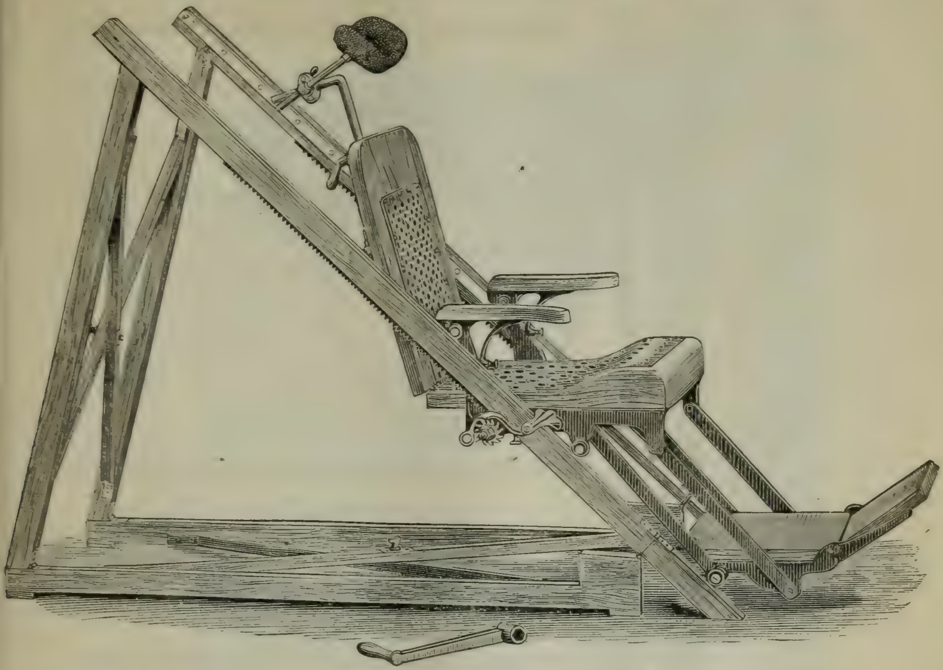
The cordial reception given to the revised and improved Ross Portable Chair proves the need for a reliable chair of its general character. Perhaps the improvements introduced have something to do with it. First of these is the having the Chair made in our own shop, thus insuring the quality of materials and workmanship. The child's seat has been omitted as unnecessary, and several minor devices for assuring rigidity have been added.

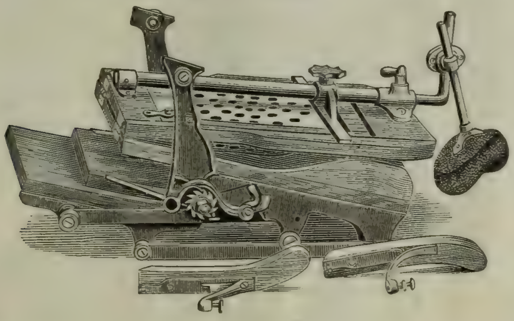


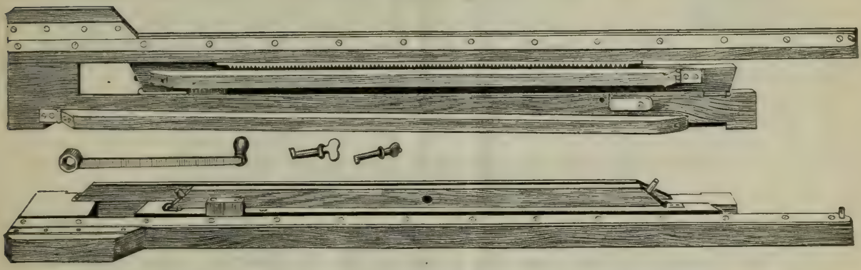
A light, strong, convenient Operating Chair, designed especially for traveling dentists. In its lowest position the seat is seventeen inches from the floor ; in its highest, thirty-four inches, giving it a vertical range equal to that of the Morrison Chair. The footstool is thirteen inches below the seat and is fixed to it

The weight ot this Chair is about seventy pounds, and it is readily taken apart and packed in a small space (see opposite page). It is made of wood, strengthened with iron. The frame is of black walnut, oil-finished. The seat and back are of perforated wood, and the head-pad is upholstered in plush.

The Ross Portable Dental Chair.



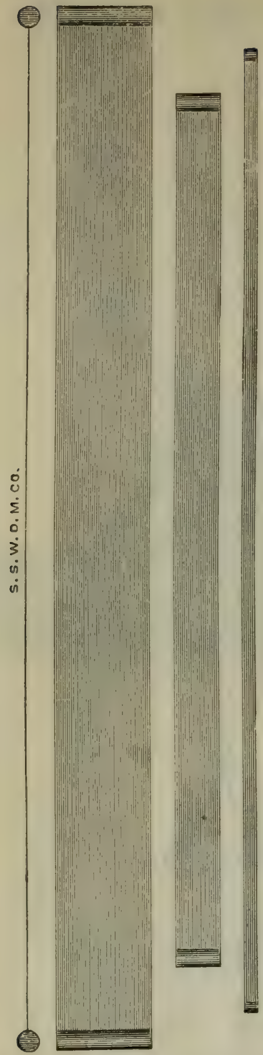




The cuts show the Chair in its highest and lowest positions; also, the parts folded ready for packing. Space occupied when folded,—by the body, 30½ x 20 x 13½ inches, and by the frame, 55½ x 5½ x 8 inches.

Price (boxing included) $65.00

No. 2 Socket fits this Chair, and any of our spittoons and spittoon-brackets can be used with it.



COMPOSITION SILVER STRIPS.

INVENTION OF DR. E. PARMLY BROWN.

For dentists' use in polishing between the teeth and dressing approximal gold fillings.

To be used with wet pulverized pumice, or other suitable powder.

Can be smoothed out, after being used, by being drawn between the folds of a towel or over the edge of a table.

Put up in packages of one dozen, in a variety of sizes.

Price . . . . per package 50 cents.

DENTAL PATHOLOGY AND THERAPEUTICS.

In the Form of Questions and Answers.

COMPILED BY

OTTO E. INGLIS, D.D.S.,

CAREFULLY REVISED AND APPROVED BY

J. FOSTER FLAGG, D.D.S.,

Professor of Dental Pathology and Therapeutics in Philadelphia Dental College.

The seven hundred and nineteen questions and answers contained in this volume cover very thoroughly the whole range of dental diseases and their treatment. There is also a list of medicaments used in dental practice, arranged in alphabetical order, with medical properties and methods of employment. A blank page for memoranda faces each printed page, affording opportunities for the notation of new remedies or methods of treatment as they are approved, so that the book is always invaluable to the practitioner as well as to the student. The practitioner must be well informed who would not find frequent occasion for reference to the pages of this work, while the student can find no such amount of information in any other volume of its size of which we have knowledge.

Octavo. Pp. 105. Sent by mail on receipt of price.
Price, cloth $3.00

NOTES ON OPERATIVE DENTISTRY.

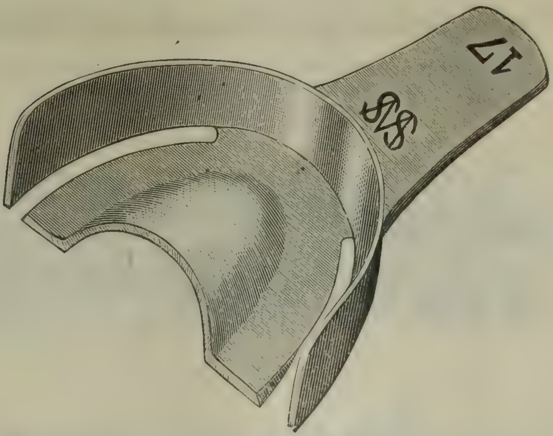
By MARSHALL H. WEBB.

Octavo. Pp. 175. Illustrated. Price, $2.25.

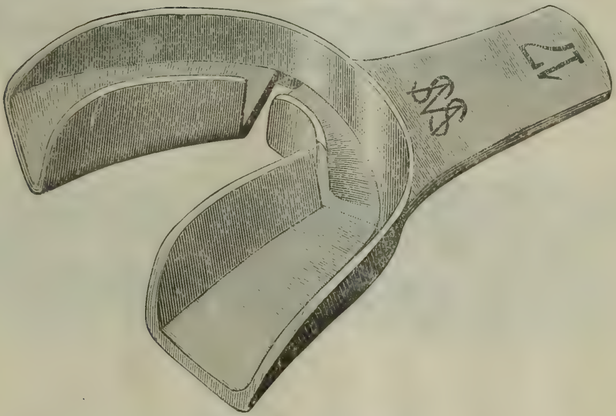
Dr. Webb's skill as an operator is known to all dentists. The methods whereby he arrived at the results which made his name famous are described in detail in this volume; followed carefully, they cannot fail to add to the skill and success of the operator.

Handsomely printed, on fine heavy paper, and neatly bound in cloth.

Britannia Impression Trays.



Upper Adjustable.



Lower Adjustable.

PRICES.

Upper No. 1 to 8	25	cents each.
" " 12 to 16	25	" "
" " 17 to 19 adjustable (patented)	35	" "
" " 2½, 3½, and 4½, especially adapted for plaster	25	" "
Lowers " 1 to 16	25	" "
" " 17 adjustable (patented)	35	" "
" " 18 and 19, Dr. Door's pattern	35	" "
" " 21 and 22, Dr. Struppler's pattern	35	" "
" " 23, Dr. Noble's pattern	35	" "
Partial Upper No. 9	20	" "
" " " 10, Dr. Mathews	25	" "
" for Crowns, No. 20, Dr. Melotte	25	" "
Franklin's Nos. 1, 2, and 3	50	" "
Wardle's Movable Palate Tray, 1 Tray and 2 Palate Plates		$1.00

Revised edition of our Impression Tray pamphlet sent on application.

Chart of Plain Teeth for Rubber Work.

Upper and Lower, Bicuspids and Molars.

Each Cut represents the Half of a Set of Twenty-eight.

56

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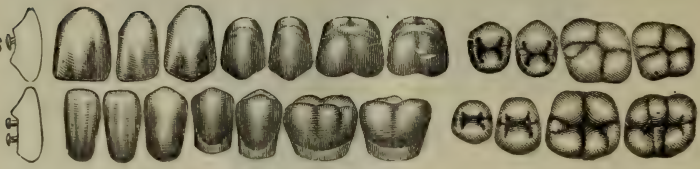

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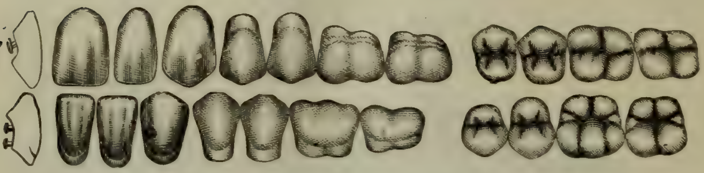

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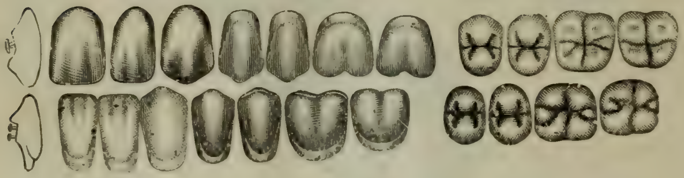

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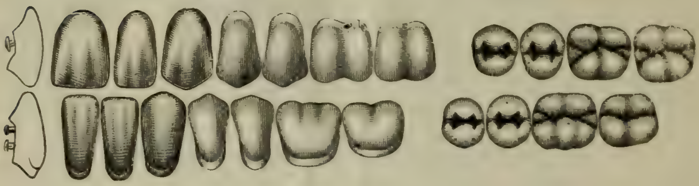

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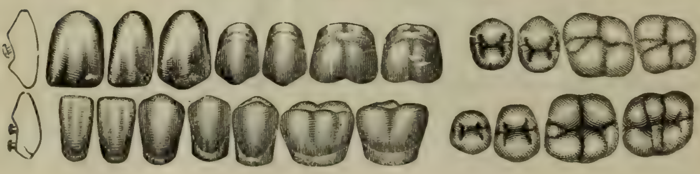

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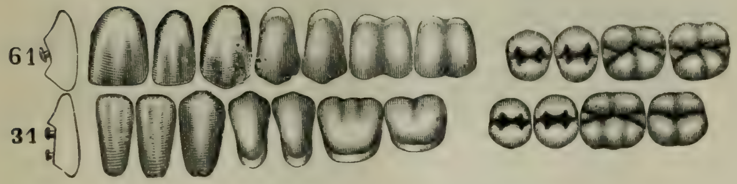

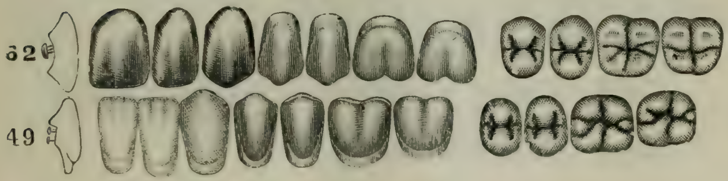

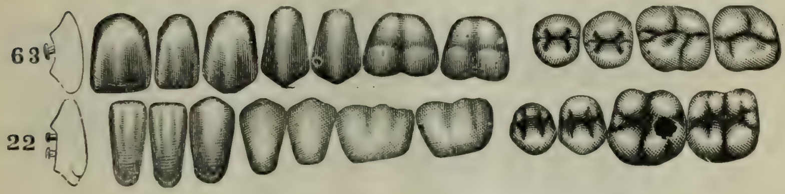

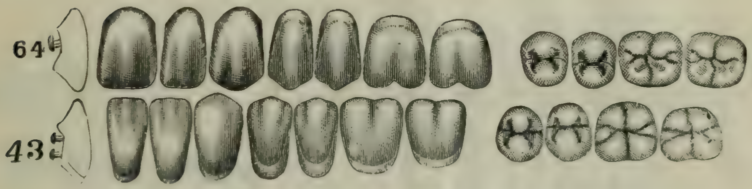

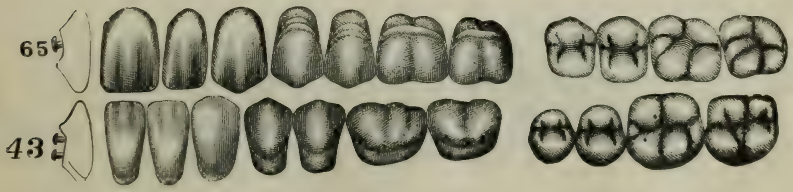

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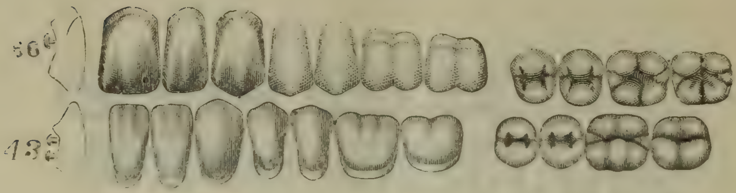

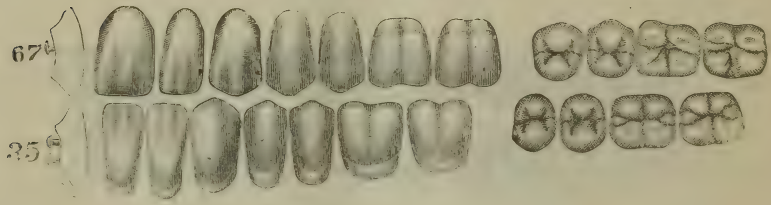

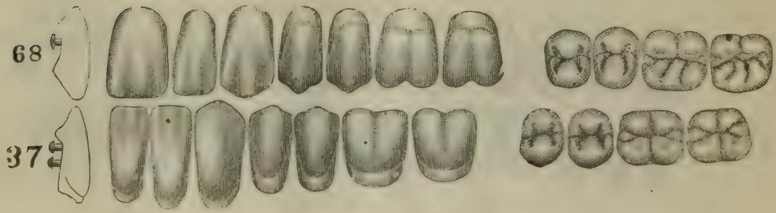

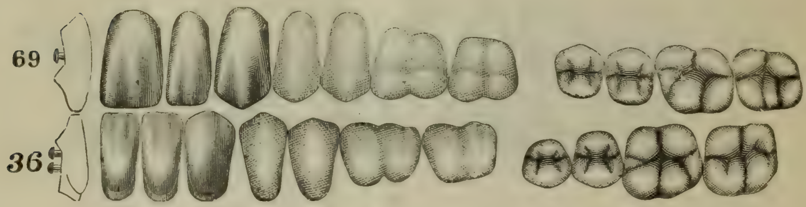

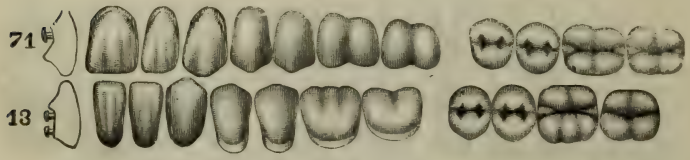

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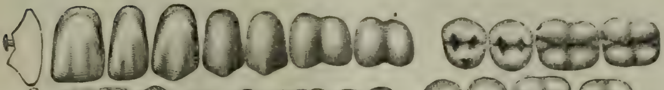

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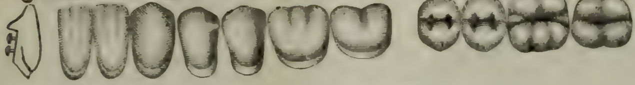

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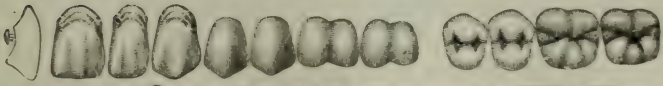

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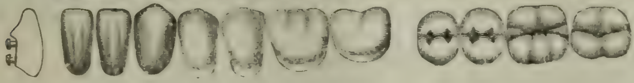

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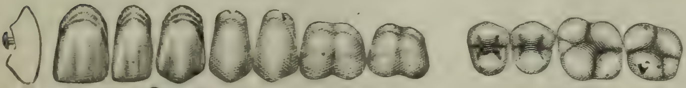

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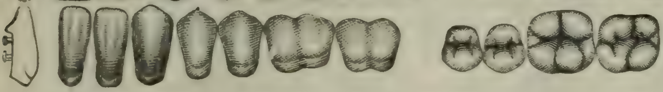

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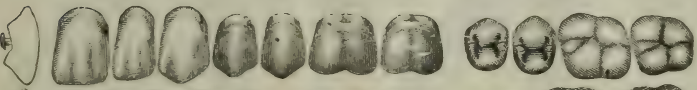

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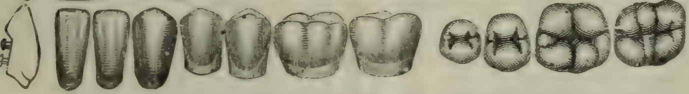

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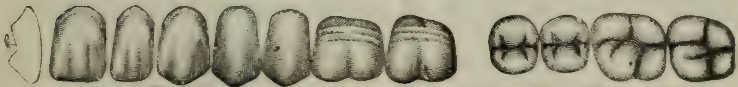

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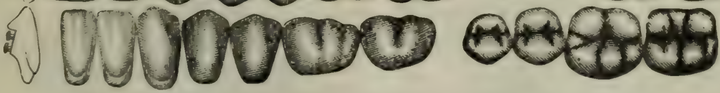


THE MANN VULCANIZER.

Patented May 25, 1886.

For the Mann Vulcanizer we claim many advantages over all others of its class.

First of these is its superior strength. The boiler is made of extra-heavy seamless copper. The quality of the material, its thickness, and the method of manufacture insure a strength far beyond what any ordinary use of the machine would require ; but to make assurance doubly sure, each boiler is tested before being put on sale by both hydrostatic and steam pressure, so that we have absolute knowledge that the strength is far in excess of requirements. The inside diameter is 4¼ inches, providing ample space for the largest flask.

In the facility with which the Mann Vulcanizer is operated is another decided advantage. The lid, instead of being screwed on to the boiler, is fitted neatly, and rests on a shoulder formed on the casting, and is secured by a heavy steel clamping-bar and screw-bolt. One end of the bar is hinged to the side of the boiler, the other end being slotted to receive the screw-bolt, which is hinged to the other side of the boiler. Rubber packing between the lid and the shoulder on which it rests makes the joint steam-tight. The lid is removed by unscrewing the nut of the screw-bolt a turn or two, when the bolt drops out of the slot and the bar is turned back, leaving the lid free to be removed. This method, while it gives as perfect a fastening as the usual plan, affords very much greater facility for opening and closing the boiler. Should the lid stick, by reason of the packing becoming chilled (a common occurrence with all vulcanizers), it is easily pried off with very much less trouble than is required when the top screws on.

Another decided advantage, to which special attention is asked, is the bail, a simple but heretofore unthought of device, which greatly facilitates the handling of the Vulcanizer, especially when hot. Thus, the boiler can be opened for the removal of one case and the placing of another. The nut of the clamping-bolt is loosened a little at a time, allowing the steam to escape gradually until the bolt is released, when the bar can be thrown back and the top of the boiler raised. The bail is also useful in removing the boiler from the jacket, in tightening or loosening the screw-bolt when closing or opening the boiler, and at all times when the boiler is to be lifted. When not in use it is readily removed.

The thermometers used are carefully and reliably made for this special purpose.

The metallic frame is screwed upon an iron cup-shaped seat, containing mercury, forming a "mercury bath."

The whole apparatus is carefully made of the best materials, and we believe it to be the most convenient and the most durable vulcanizer on the market.

We have adopted for the Kerosene outfit of the Mann Vulcanizer the "4-inch Burner Kerosene Stove," which has a larger wick and will thus give more heat than the heater formerly sold for the purpose. No change in price.

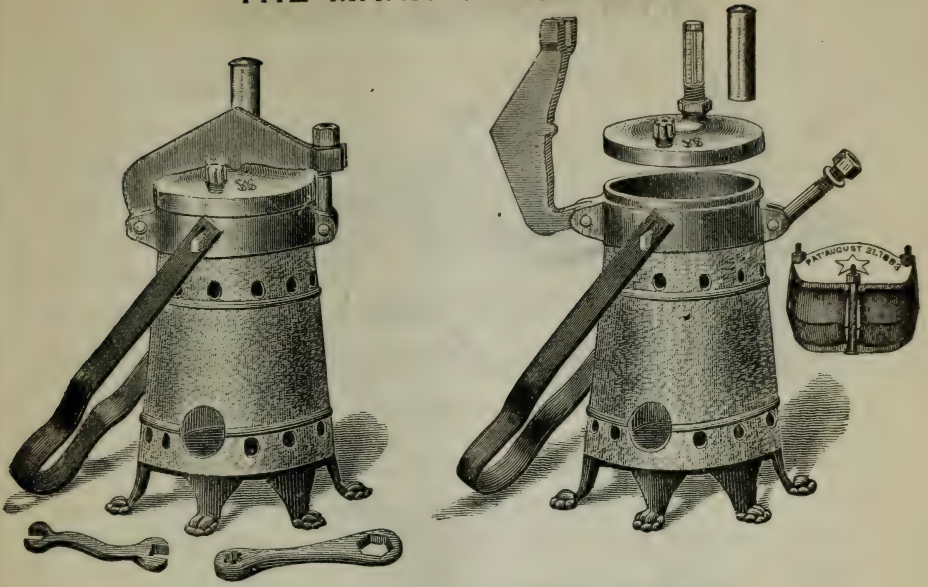
PRICE-LIST OF THE MANN VULCANIZERS.

WITHOUT STEAM-GAUGE.

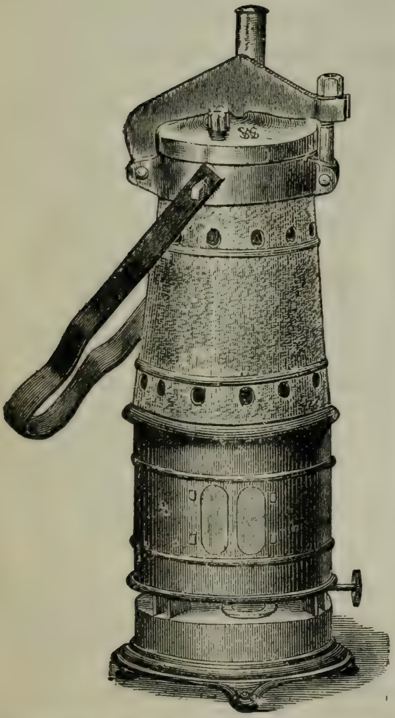
Two-Case Vulcanizer, for Alcohol	$18.00
" " " " Gas	18.00
" " " " Kerosene, with 4-inch Burner Kerosene Stove	18.50
" " " " " " No. 1 Hot-Blast Stove . .	20.75
Three " " " Alcohol	20.00
" " " " Gas	20.00
" " " " Kerosene, with 4-inch Burner Kerosene Stove	20.50
" " " " " " No. 1 Hot-Blast Stove	22.75

Steam-Gauge adds $7.00 to these prices.

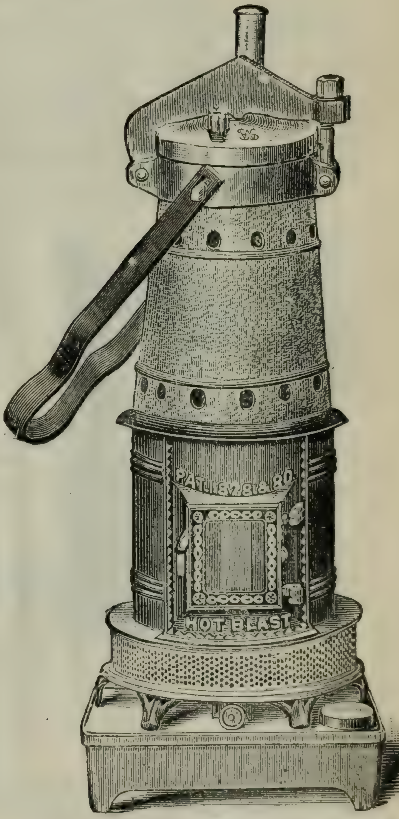
THE MANN VULCANIZER.



Two-Case Vulcanizer rigged for Gas or Alcohol.



Two-Case Vulcanizer rigged with 4-inch Burner Kerosene Stove.



Two-Case Vulcanizer rigged with No. 1 Hot-Blast Stove for Kerosene.

Bow-Spring Rubber.

Trade-Mark, No. 1847, Registered June 23, 1874.

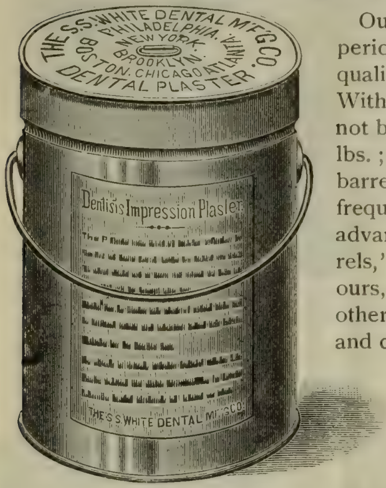
A "*New Departure,*" not in the quality or make-up of the Rubber itself. That was settled finally seventeen years ago, and settled so happily that the "Bow-Spring" became the recognized standard, a position it has easily held ever since. The "New Departure" is simply an additional way of putting it up,—in thin sheets. This form comes in usefully in many ways. Purchasers now have their option—thin sheets or thick sheets, it being understood that what we here call thick sheets are the regular thickness in which "Bow-Spring" Rubber has always been sold.

PRICES OF EITHER.

Less than 5 lbs.	per lb. $2.75	In 10-lb. lots	per lb.	$2.25
In 5-lb. lots	" 2.50	In 25-lb. lots	"	2.00

DENTISTS' PLASTER,

FOR TAKING IMPRESSIONS AND MAKING CASTS.


THE S.S. WHITE DENTAL MF'G CO.
PHILADELPHIA.
NEW YORK.
BROOKLYN.
BOSTON. CHICAGO. ATLANTA.
DENTAL PLASTER.
Dentists Impression Plaster
THE S.S. WHITE DENTAL MF'G CO.

Our Dentists' Plaster has two points of superiority: Quality and honest dealing. Its quality needs no exploiting. It is known. With regard to the other point, a word may not be out of place. For a barrel we sell 300 lbs.; for a half-barrel, 150 lbs.; for a quarter-barrel, 75 lbs. The packages are never less, frequently more, and then the buyer gets the advantage. So-called "barrels," "half-barrels," and "quarter-barrels," smaller than ours, and containing less plaster, are sold by others. Our cans are packed by machinery and contain the quantity they are advertised to contain every time; they have the name, etc., stamped in the lid as shown. Others, packed by hand, are apt to give short measure.

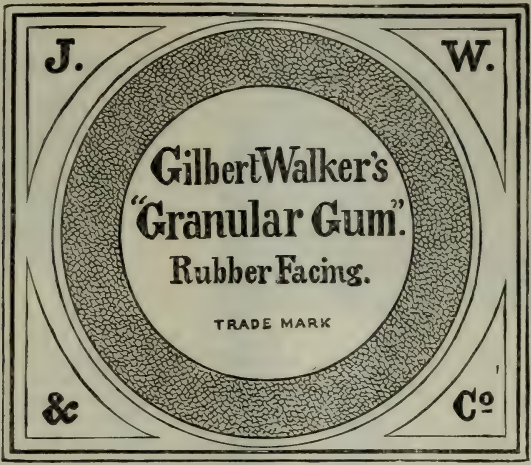
PRICES.

Two-Quart Can	$0.30	Three-Peck Can	$2.00
Six-Quart Can	.70	Quarter-Barrel	1.60
Twelve-Quart Can	1.15	Half-Barrel	2.50
Half-Bushel Can	1.45	Barrel	3.50

These are the prices at Philadelphia. Freight and expenses added when sold at other depots. Boxing on cans, and porterage, extra.

Dr. Gilbert Walker's
Vulcanizable "Granular Gum" Facing.

Patented January 1, 1889.



This material is a decided improvement upon the solid color of pink rubbers for facings. When vulcanized, polished, and wetted (as by the saliva), it approximates the appearance of the well-known continuous-gum work, and as there are several shades, the dentist can either match the natural gum adjoining the artificial gum of the partial denture, or suit the color of a full denture to the complexion of the patient, as circumstances may require.

"Granular Gum" vulcanizes with any dental rubber, and a very thin facing is sufficient. Wrapped in tin foil and put up in envelopes containing one ounce, which will serve for four full sets. Directions with each package.

PRICES.

No. 1.	Mottled Granular Gum	per ounce $1.00
No. 2.	Purple Tint Dark Granular Gum . .	per ounce $1.15
No. 2A.	" " Light " " . .	
No. 3.	Florid " Dark " " . .	
No. 3A.	" " Light " " . .	

DENTAL METALLURGY.

By CHAS. J. ESSIG, M.D., D.D.S.,

Professor of Mechanical Dentistry and Metallurgy in the University of Pennsylvania, Dental Department.

SECOND EDITION. REVISED AND ENLARGED.

"It is not often we meet with a book which meets so well the requirements of those whom it is destined to serve. And we feel justified in particularly recommending this book to dental students."—*Brit. Jour. of Dental Science.*

Price, postpaid	$1.75

DIAGRAM OF THE FIFTH NERVE.

NEW EDITION.

We have just published a new edition of the well-known Diagram of the Fifth Pair of Nerves, which is confined entirely to the illustration of the ramifications of the great trifacial nerve and its branches.

Price, with Key and Description	$1.00
" mounted on Rollers	1.50
" " in Frame, without Glass	2.00

Surface-Cohesion Forms for Artificial Dentures,

Invention of Dr. Joseph Spyer. Patented January 6, 1885; December 8, 1885.

FIG. 1.

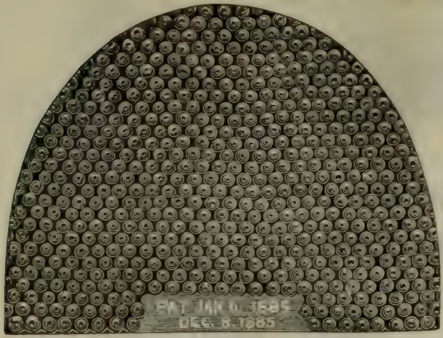
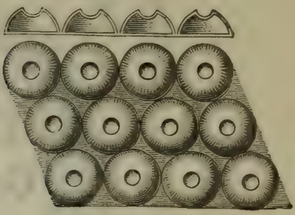


FIG. 2.



A thin metallic Form, the surface of which is covered with minute papilliform prominences—shown in Fig. 2 magnified four diameters—which by displacement of mucus at the points of gum contact effect surface cohesion as if the denture were glued to the gums, yet cause no irritation and leave no marked indentations. Adapted for either upper or lower plates. By the aid of this device strong cohesion can be had with a narrow plate, and thus the sense of taste be left unimpaired. Lower plates so made are very firm. Put up in packages containing one dozen Forms size of Fig. 1, which can be cut for either upper or lower plates. Full directions accompany each package.

Price . . . per box containing one dozen Forms $1.00
Rubber Cement . . . per dozen $4.00; per bottle .35

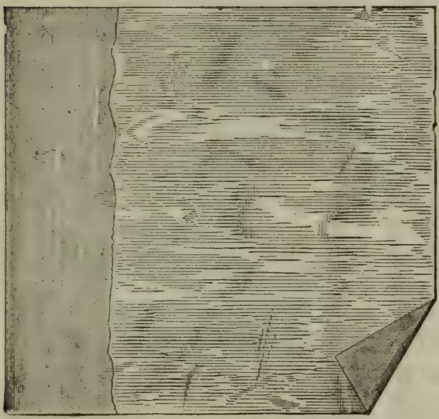
These Forms are also made of Gold with a thin lining of Silver, similar to our Vulcan Gold Lining, and for like use. Thickness of No. 120 Foil.

Price . . . . each $2.50

THE VULCAN GOLD LINING.

A PERFECT GOLD COVERING FOR RUBBER PLATES.

PATENT APPLIED FOR.



In this Gold Lining we claim advantages over others as follows:

The Gold is applied in one piece to the surface to be covered.

No extra care is required in packing the flask.

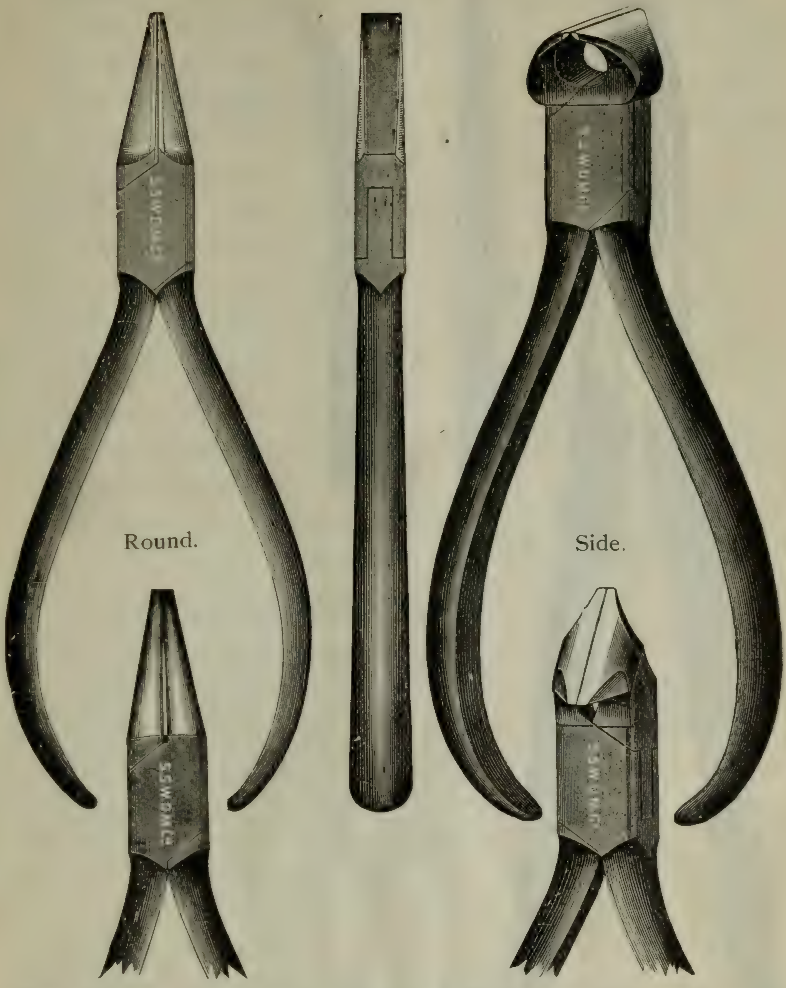
The Lining is composed of chemically pure Gold with a thin covering of pure Silver. The union between the rubber plate and the Gold Lining is mechanical; the sulphur in the rubber when set free by the action of vulcanizing corroding the surface of the silver, to which the rubber adheres perfectly.

If the rubber plate is covered on both sides it is tougher when vulcanized, for the reason that during this process the pressure against the metal gives the plate a surface more dense than it will have if vulcanized in contact with plaster.

The sheets are of the thickness of No. 20 foil, and each book contains about forty-eight (48) square inches,—more than enough to cover six ordinary size plates on one side, or four plates on both sides.

Price . . . . per package $5.00

SOLID STEEL PLIERS AND NIPPERS.



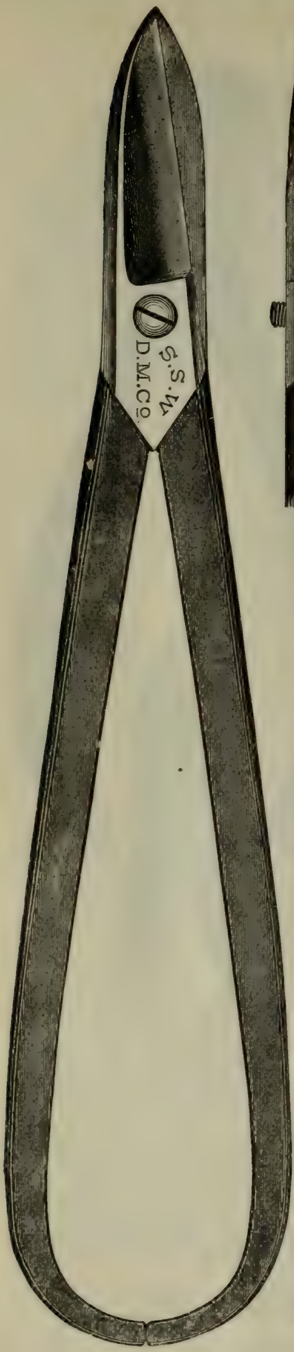
Two important points of this fine line of Pliers and Nippers : First, they are of steel throughout, the ordinary appliances of their class having iron handles with steel-faced points. Second, the finely proportioned and neatly and smoothly wrought-out handles afford firmness of grip with a comfortable "feel," the ends being rounded off so as to avoid cutting or bruising the hand when pressure is applied.

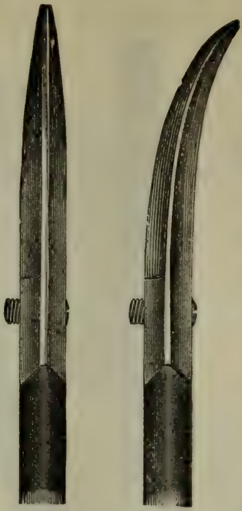
The Nippers, both front and side, are made in two sizes, 4 and 4½ inches ; the Pliers in three sizes, 4, 4½, and 5 inches.

PRICES.

Nippers, Front or Side,	4 or 4½ inches,	Plain .	per pair,	$0.80
" " "	4 or 4½ "	Nickel-plated	"	1.00
Pliers, Flat or Round Nose,	4 or 4½ inches,	Plain	"	.50
" " " "	4 or 4½ "	Nickel-plated	"	.65
" " " "	5 inches,	Plain . .	"	.55
" " " "	5 "	Nickel-plated .	"	.70

Plate Shears for Crown- and Bridge-Workers.





Designed especially to permit the delicacy and nicety of manipulation so frequently necessary in constructing crowns and bridges. To this end the blades are made short and strong, with small, neat points, and the handles light and relatively long so as to afford ample leverage. Cuts are full size.

Made of solid steel, either straight or curved.

Price, Straight . . per pair $0.90
" Curved . . " 1.15

IDEAL DENTAL BASE-PLATE.

Dr. Head's preparation justifies in practical experience all the claims made for it. It is readily adapted to the model, which it fits like a glove; it will not change its shape in the mouth; it is easily mended, if broken; and with it the bite and the articulation can be taken as readily as if the teeth were mounted on a metal plate. So rigid is it, in fact, and so firm the hold of the teeth, that it may be used for a temporary mount while the patient's permanent set is being repaired.

Put up in boxes containing one dozen sheets, with full directions for use.

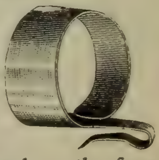
Price . . . . . per box 60 cents.

Manufactured by FRANCIS HEAD.

The S. S. White Dental Mfg. Co., Sole Agent.

IMPROVED FINGER SPONGE-HOLDER.

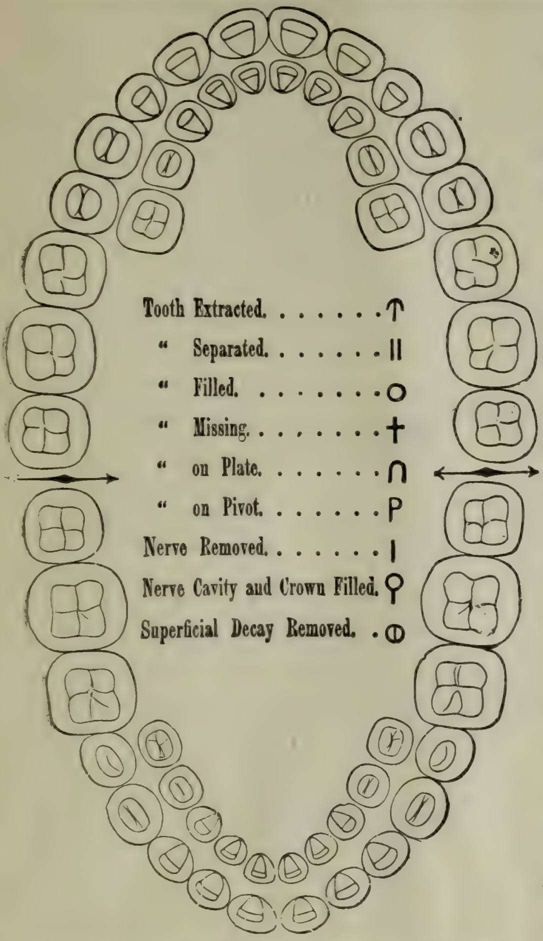
Devised by DR. GORDON WHITE.



An adjustable finger-ring carries a little hook for catching in and holding a bit of sponge, which can readily be detached when foul and replaced by a fresh piece. The ring being adjustable, will fit any finger. In dressing down a root it is placed on the forefinger of the left hand; in grinding a crown or polishing bridge-work, it may be worn on the middle finger of the same hand. It will be found a convenience.

Price . . . . each 40 cents.

ALLPORT'S
REGISTERING DENTAL LEDGER.


Tooth Extracted. . . . . . . ↑
" Separated. . . . . . . ‖
" Filled. . . . . O
" Missing. . . . . †
" on Plate. . . . . . . ∩
" on Pivot. . . . . . . P
Nerve Removed. . . . . . . |
Nerve Cavity and Crown Filled. ♀
Superficial Decay Removed. . ⦶

A Ledger for Dentists' use, designed by Dr. Allport, of Chicago, and intended to facilitate the registering of accounts.

The annexed cut represents a diagram, of which there are two on each page, with space alongside of each, appropriately ruled for name of patient, reference, date of operations, charge for the same, and credit for amounts paid.

The symbols denote the character and locality of the various operations performed, thus showing at a glance the history and condition of the mouth of each patient.

These books are made in neat style, printed on good paper, and substantially bound.

The Ledger has had extensive sale and is still in large demand.

PRICES.

340 pages, half Turkey, Cloth Sides	$3.50
340 " " Roan, Paper sides	3.00
172 " " " " "	2.00

Specimen pages sent on application.

Bill-heads, with Diagram same as in the Ledger, known as our Bill-Head No. 3, 8½ x 7 inches.

Dentists' Pocket Diary and Appointment Book,

FOR

REGISTERING APPOINTMENTS FOR DENTAL OPERATIONS.

	MONDAY.		18
8	[illegible]	1	
	[illegible]		
9	[illegible]	2	
	[illegible]		
10		3	
11	[illegible]	4	
	[illegible]		
12		5	

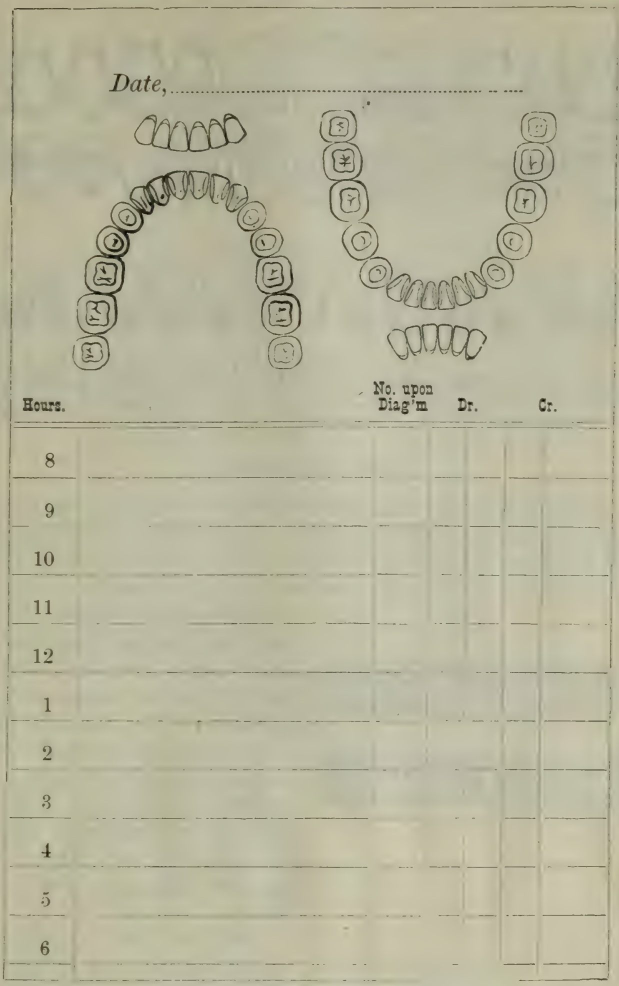
	TUESDAY.		
8		1	
9		2	
10		3	
11		4	
12		5	

	WEDNESDAY.		
8		1	
9		2	
10		3	
11		4	
12		5	

The above Diagram shows the exact size and style of a page of the Pocket Diary, presenting, when open, engagements for one week. The figures denote the hour of the engagement. It contains blanks for 54 weeks, and, being without date, is good for any time. It has also a neat memorandum attached.

Flexible Cover, Gilt Edge	$0.75
" " " " with Pocket and Tuck . .	1.00

DENTISTS' POCKET APPOINTMENT AND RECORD BOOK.



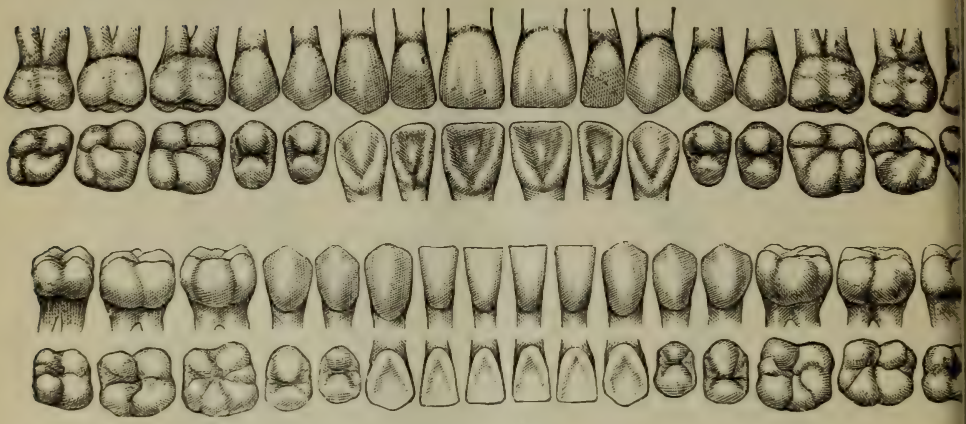
Date,..

Hours.		No. upon Diag'm	Dr.	Cr.
8				
9				
10				
11				
12				
1				
2				
3				
4				
5				
6				

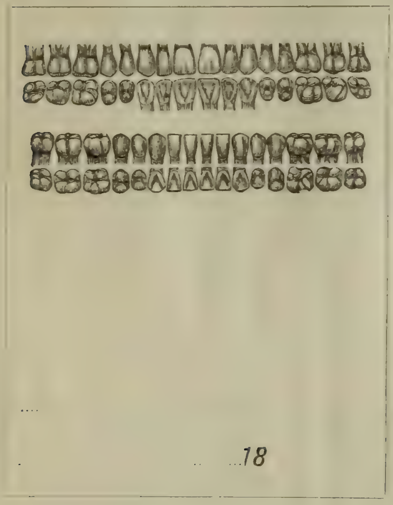
The diagram above shows the size and style of the Record pages, of which there are 360; there are besides 32 pages for memoranda. In the front of the book are calendars for several years, and a table showing the number of days from any given day to the same day in any other month in the year. The diagram being printed in red ink, pencil-marks, however faint, are readily distinguishable. Bound in Morocco, with Tuck; also, in same with Tuck and two Pockets.

Price, with Tuck	$1.00
" " " and two Pockets	1.25

EXAMINATION RECORD.



Dr. Charles F. Allan's "Examinations" scored an immediate success. The first edition was sold in a few months. In this plan of keeping records of examinations, Dr. Allan states that his object is not to give the patient a reminder of the state of his or her teeth at the time they were examined, but to keep the record for his own use. To this end he has the diagram shown above printed on leaves (one side only) 5¾ x 7½ inches. At the bottom of each leaf are blanks for the name of patient and date of examination, the space intervening being used for such memoranda as may be required. The leaves are bound in oblong books containing 100 each, on the front cover of which is the imprint "Examinations. From......... to...................."



....

..18

Keeping these accessible, he has only to refer to his ledger to get the date of any examination made ; then turn to the "Examinations," and it is but a moment's search to find the one wanted.

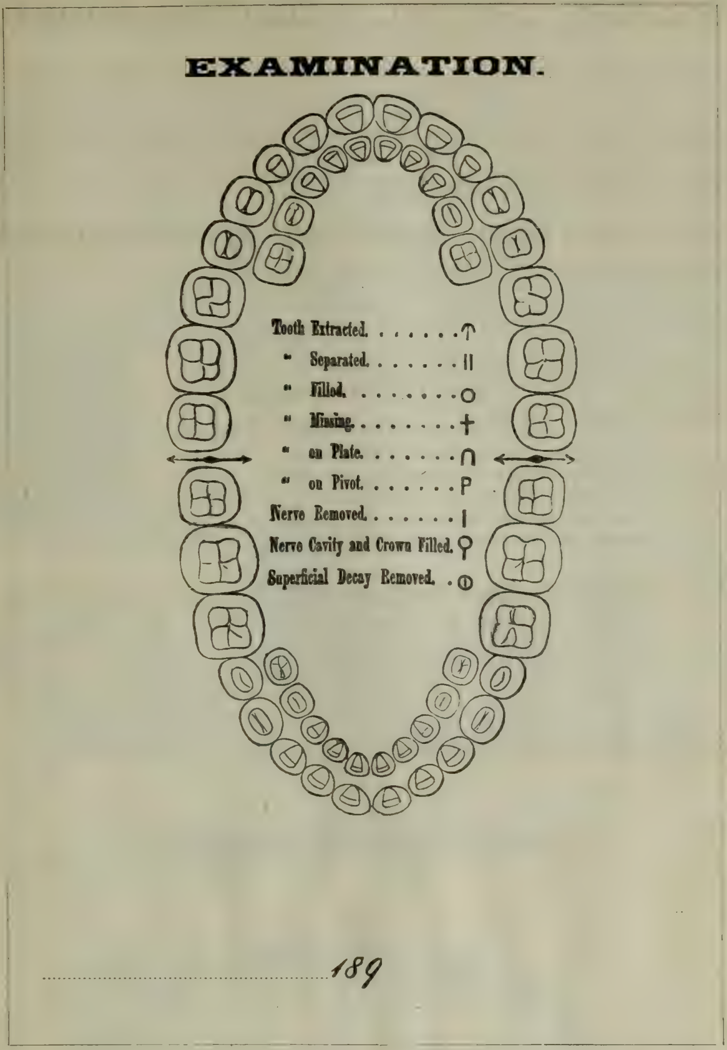
The diagram, it will be seen, is one of the most complete in its exposition of the various surfaces of the teeth that has yet been brought forward. The page is too large to be shown full size, but we are able to give it in miniature.

Price, per book of 100 Diagrams, 5¾ x 7½ inches . . 30 cents.

In response to inquiries from several practitioners we have also made a stock of the books, with the leaves numbered, and four ruled pages for indexing.

Price, Indexed and Paged . . . . 40 cents.

EXAMINATION BLANKS.



EXAMINATION.

Tooth Extracted.	↑
" Separated.	‖
" Filled.	○
" Missing.	+
" on Plate.	∩
" on Pivot.	P
Nerve Removed.	|
Nerve Cavity and Crown Filled.	♀
Superficial Decay Removed. .	⦶

....189

The reverse side of these Examination Blanks is prepared for memorandum accounts. Size 5⅜ x 3¾ inches. Put up in tablets of 50 each.

Price . . . . per tablet 20 cents.

DENTISTS' BILL-HEADS.

PUT UP IN TABLETS OF 100.

PRICES.

No. 1	per hundred	60	cents.
" 2	" "	40	"
" 3	" "	60	"
" 4	" "	60	"
		45	

THE MEREDITH
POCKET DENTAL ACCOUNT BOOKS.

Being carried in the pocket, the Meredith Pocket Dental Account Books are always at hand when wanted for recording an appointment or operation. The various books of the series are very nicely adapted for their particular use. The space is economically used. Operations on the temporary teeth may be recorded without danger of mistake, and each operation having a space and diagram of its own cannot be mistaken for one performed at some other time.

There are three books in the series:

The Pocket Dental Register and Appointment Book

contains 224 pages, divided as follows: 120 pages for small accounts, ten to the page, each supplied with a diagram for locating operations; 24 pages for medium accounts, two to the page; 16 pages for larger accounts, one to the page; 16 pages with ten accounts to the page for operations on the temporary teeth; 32 pages for appointments, twelve days to the page (sixty-four weeks), good for any time; and 16 pages for memoranda.

For dentists of small practice this book supplies all the requirements.

The Pocket Dental Journal and Appointment Book,

Designed for use as the day-book and journal of the merchant, for recording the operations of the day as they are completed, which are afterwards to be posted to a ledger. There are 176 pages with ten blanks to the page; 8 pages for operations on temporary teeth; 32 pages for appointments, and 8 pages for memoranda. It may be used in connection with any of our dental ledgers, or with

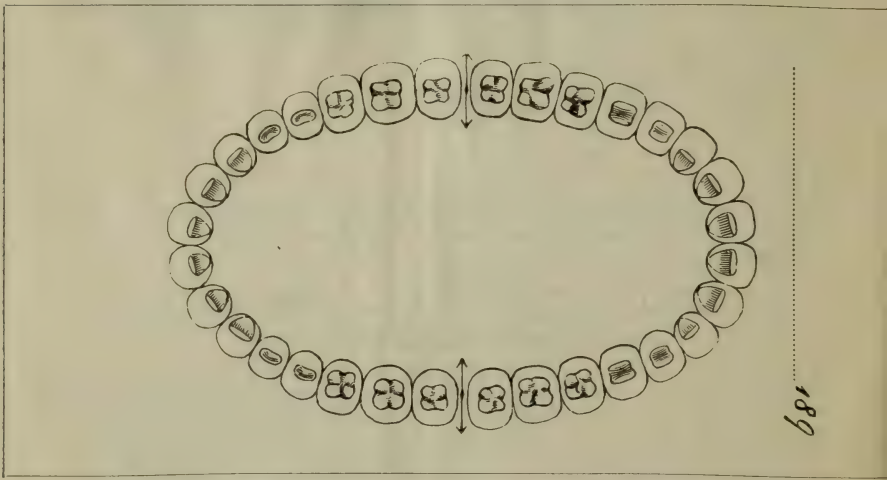
The Pocket Dental Ledger and Appointment Book,

Made up principally of the large and medium blanks used in the Register, and therefore to be used more especially as a Ledger or condensed statement of the work recorded in the "Journal." It has 96 pages for medium accounts, two to the page; 72 pages for large accounts, one to the page; 8 pages for operations on temporary teeth; 32 pages for appointments; and an ample index and pages for memoranda.

Prices uniform for all the above.

Cloth	$1.25
Leather, with Tuck	1.50

MEMORANDUM BLANKS.



The size and style are shown by the diagram. Plain backs. 100 in a tablet.

Price . . . . per tablet $0.20

The Micro-Organisms of the Human Mouth.

The Local and General Diseases which are Caused by Them.

By WILLOUGHBY D. MILLER, D.D.S., M.D.,

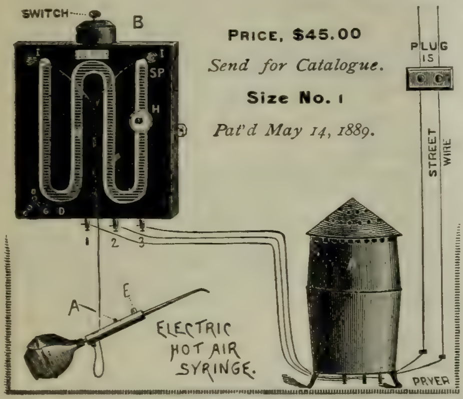
Professor at the University of Berlin.

With 128 engravings on wood, one chromo-lithographic and two photo-micrographic plates.

The book contains nearly 400 pages, octavo, handsomely printed on fine paper, with full Bibliography and Indices. Price, by mail, cloth, $5.00.

Sent carriage free to any address on receipt of price.

THE S. S. WHITE DENTAL MFG. CO., Publisher.



PRICE, $45.00

Send for Catalogue.

Size No. 1

Pat'd May 14, 1889.

MEDICAL AND DENTAL FRATERNITIES!

GISH

IDEAL RHEOSTAT

(GUARANTEED)

will furnish the **GALVANIC, GALVANO-CAUTERY** and **FARADIC CURRENTS**; operate the electric mallet, mouth lamp, hot air syringe and all electrical instruments, from **INCANDESCENT** light circuits, with perfect safety.

No Lamps or Fluids to Annoy You.

Order through your dealers or address

JOHN L. GISH, M. D., D. D. S.

Jackson, Michigan.

SECOND-HAND CHAIRS, ENGINES, ETC., FOR SALE.

AT THE PHILADELPHIA DEPOT.

1 Perkins Chair (Rosewood) and Spittoon, Maroon Plush, fair order	$50.00
1 Snowden & Cowman Chair, Maroon Rep, with Spittoon and Footstool, good condition	40.00
1 No. 4 Archer Chair, with Footstool and Spittoon (with white marble top)	45.00
1 Seabury Vulcanizer, O. S.	15.00
1 Reservoir Attachment and Spittoon	25.00
1 Suspension Engine, including Fusee & Sheave Pulley—Less Crane, with No. 2 Right-angle and 69 Points	20.00
1 Snow & Lewis Mallet, good condition	6.00
1 No. 1 Single Muffle Furnace, with 1 Muffle and Slide, half-peck fire-clay. Never used, only rusty	15.00

AT THE BOSTON DEPOT.

1 Pedal-Lever Chair, newly upholstered in Maroon Plush and put in thorough order, good as new, with Spittoon	$145.00
1 Pedal-Lever Chair, Maroon Plush, with Spittoon, in good order	105.00
1 Morrison Chair, Maroon Plush, with Spittoon, all in good order, for	80.00
1 Archer No. 3 Chair, Maroon Plush, with Footstool and Instrument Crane and Table, in the best of order, good as new, the whole lot cheap for	55.00
1 Snow & Lewis Mallet, in good condition, only	5.00
1 Morrison Nickel-plated Bracket, nearly new	13.00
1 Cogswell Cabinet, with Stand	25.00

AT THE CHICAGO DEPOT.

1 Harris Chair, Medium Base, Green Plush	$30.00
1 Taylor Chair, Crimson Plush	25.00
1 Iron Chair, Moquette Upholstery	25.00

The prices named do NOT include charges for Boxing, when necessary.

NOTICE OF REMOVAL.

Dr. John H. Spaulding begs to announce that he has terminated his association with Dr. J. W. Crane, and established himself at No. 36$^{\text{bis}}$ Avenue de l'Opéra (over Tiffany's), Paris, France, where he will be at the service of any patients that his professional friends may kindly refer to him.

NOTICE.

Charles B. Atkinson, D.D.S., will continue the practice of the late firm of Wm. H. & Charles B. Atkinson at the same location, No. 41 East Ninth Street, New York. The former office hours will be maintained, namely: 9 A.M. to 2 P.M.

This notice is deemed proper from the fact that a statement suggesting the discontinuance of the practice and closure of the office has repeatedly appeared in the correspondence of dental journals and elsewhere. This office has been continuously open (except between April 2 and 6, 1891) during the established operating hours, and will continue to be open to all of the late Dr. Atkinson's friends in the profession.

WANTED,

A first-class dental operator at the New York Dental Rooms, St. Louis, Mo. Must have eight to ten years' experience. One who is a first-class and fast filler, and good at bridge-work. Must know how to build up gold crowns and do crown-work. Must not drink. Good salary to a first-class man. *An all-around man preferred.* Address Dr. R. T. SANDERS,

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On account of ill-health, a $5000 practice at Washington, D. C. Office well located; front and back parlors, operating room, and laboratory well furnished. Lease for two years. Good opportunity for first-class man. Will make easy terms for cash. Will satisfy purchaser by showing account-books and giving good reference. Purchaser must be a good dentist, with best references. None other need apply. Must have at least $1200 in cash to buy outfit of office. Be prompt and business-like. E. R. RUST, D.D.S.,

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FOR SALE ABROAD,

A high-class dental practice, established twenty years; the largest and best in a leading foreign city. Particulars will be furnished on application to those who are known, or anyone sending satisfactory references with letter of inquiry. Address "ABROAD,"

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The Northwestern Dental Infirmary, of Chicago; the largest practice ever offered for sale in the city. The business differs from a private practice from the fact that purchaser can step right in and from the start do as well as present owner, as patients inquire for the above office, not for the owner or for any particular dentist. When any operator leaves, his place is filled immediately, and the work goes on with no loss whatever to the business. Finest and most central location; runs four chairs; lease runs until after the World's Fair. An immense business from now on. Write to any dental depot in regard to location, business, etc. Price $10,000 cash for the plant, with best of reasons for selling. For particulars, address H. C. MAGNUSSON,

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DR. FRANK R. FABER,

AMERICAN DENTIST,

PHILADELPHIA DENTAL COLLEGE, CLASS '78-'79.

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Winter Course

WILL BEGIN

Wednesday, Sept. 23, 1891.

FOR INFORMATION, ADDRESS

DR. TRUMAN W. BROPHY, DEAN,

96 State Street.

UNIVERSITY OF MARYLAND.

DENTAL DEPARTMENT.

N. E. COR. LOMBARD AND GREENE STREETS, BALTIMORE, MD.

Hon. SEVERN TEACKLE WALLIS, LL.D., Provost.

FACULTY.

Ferdinand J. S. Gorgas, M.D., D.D.S., Professor of Principles of Dental Science, Surgery, and Mechanism.

James H. Harris, M.D., D.D.S., Professor of Operative and Clinical Dentistry.

Francis T. Miles, M.D., Professor of Physiology.

L. McLane Tiffany, M.D., Clinical Professor of Oral Surgery.

J. Edwin Michael, M.D., Professor of Anatomy.

R. Dorsey Coale, Ph.D., Professor of Chemistry and Metallurgy.

I. Edmondson Atkinson, M.D., Professor of Materia Medica and Therapeutics.

John C. Uhler, M.D., D.D.S., Demonstrator of Mechanical Dentistry.

Isaac H. Davis, M.D., D.D.S., Demonstrator of Operative Dentistry.

Herbert Harlan, M.D., Demonstrator of Anatomy.

The Principal Demonstrators are assisted by *sixteen* Assistant Demonstrators. Special Instructions are given in Continuous-Gum and Bridge-Work.

CLINICAL INSTRUCTORS.

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Dr. A. J. Volck, Md.
Dr. Sam'l J. Cockerille, D. C.
Dr. E. S. Chisholm, Ala.
Dr. Geo. H. Winkler, Ga.
Dr. T. T. Moore, S. C.
Dr. John Murray, Penna.
Dr. W. S. McDowell, Md.
Dr. William Farmer, Va.
Dr. Judson B. Wood, Va.
Dr. George H. Chewning, Va.
Dr. G. S. F. Wright, S. C.
Dr. Walter S. Harban, D. C.
Dr. Frank L. R. Wood, Me.
Dr. Ellis B. Bliss, D. C.
Dr. Arthur M. Rice, Conn.
Dr. L. M. Cowardin, Va.
Dr. David Genese, Md.
Dr. Charles L. Steel, Va.
Dr. J. Allan Osmun, N. J.
Dr. Sam'l A. White, Ga.
Dr. W. W. Allport, Ill.
Dr. J. B. Patrick, S. C.
Dr. W. W. Evans, D. C.
Dr. L. G. Noel, Tenn.
Dr. V. E. Turner, N. C.
Dr. Geo. W. Field, Eng.
Dr. W. C. Wardlaw, Ga.
Dr. A. F. Claywell, Tenn.
Dr. Geo. B. Steel, Va.
Dr. Henry C. Jones, Va.
Dr. W. S. Carruthers, Texas.
Dr. Dan'l McFarlan, D. C.
Dr. A. G. Bouton, Ga.
Dr. Thos. H. Davy, Md.
Dr. B. H. Teague, S. C.
Dr. Wm. B. Wise, Va.
Dr. S. Dwight Hodge, Vt
Dr. C. P. Baird, Tenn.
Dr. Edwin S. Niles, Mass

At stated times during the Annual Sessions a number of the Corps of Clinical Instructors will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the Infirmary. Forming one of the departments of *one of the oldest Universities* in this country, its diploma is everywhere recognized and honored.

The instruction in both operative and mechanical dentistry is as thorough as it is possible to make it, and embraces everything pertaining to dental art. The advantages which the general and oral surgical clinics, to which the dental students are admitted, as indeed to all the lectures of the University, afford, cannot be overestimated. The many thousands of patients annually treated in the University Hospital, well known to be the largest Hospital in Baltimore, afford an abundance of material for dental infirmary and laboratory practice, and the oral surgery clinics.

The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs. It has again become necessary to enlarge the Dental Building, making an Infirmary nearly one hundred feet long, and a Laboratory eighty feet long and forty-three feet wide.

The Dental Infirmary and Laboratory are open daily (except Sundays) during the entire year for the reception of patients; and *the practice for dental students* has increased to such an extent that all the students during the past session have had an abundance of practical work in both operative and prosthetic dentistry. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions. The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equally with the Medical Students to become familiar with the diseases and operations of Practical Surgery. Excisions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxide gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology (for which an abundance of material is furnished **free of charge**), also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time in assisting the students and directing their labors. **Dissecting Material is furnished in abundance, free of charge.**

The Qualifications for Admission and Graduation are those adopted by the National Association of Dental Faculties and the State Dental Examining Boards. The Diplomas of this School are recognized by all State Dental Examining Boards.

Qualifications for Graduation: The candidate must have attended two full courses of lectures of five months each in different years at the **Regular** or Winter Sessions in this institution. The following, however, will be considered as an equivalent to an attendance on one course of lectures in this College:—One course in any reputable Dental College; graduation in a reputable Medical College with one year of dental pupilage in a dental infirmary. The student meeting either of the above requirements will have the privilege of presenting himself as a candidate for graduation at the end of but one Course of Lectures. The matriculant must have a good English education; a diploma from a reputable literary institution, or other evidence of literary qualification will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantages in operative and mechanical dentistry in this institution throughout every session.

Graduation in Medicine: Graduates of the Dental Department of the University of Maryland are required to attend but **one session** at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The **Regular or Winter Session** will begin on the 1st day of October, and will terminate in March of each year.

The **Summer Session**, for practical instruction, will commence in March, and continue until the regular Session begins. Students in attendance on the Summer Session will have the advantages of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are $100, Demonstrators' Fees included; Matriculation Fee, $5; Diploma Fee, for candidates for graduation, $30; Dissecting Ticket, $10.

For Summer Session, no charge to those who attend the following Winter Session.

Beneficiary.—A Beneficiary student will be received from each State, on the recommendation of the State Dental Society, on the payment of half of the tuition fees. Board can be obtained at from $3.50 to $5 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

F. J. S. GORGAS, M.D., D.D.S.,
Dean of the Dental Department of the University of Maryland,
845 N. Eutaw Street, Baltimore, Md.

Indiana Dental College.

Thirteenth Annual Session begins Thursday, October 1, 1891.

A thorough and complete course in all branches of knowledge pertaining to dentistry.

Special individual instruction in Crown-, Bridge-, and Porcelain-work.

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Fall and Winter Session

BEGINS

October 1, 1891.

The Practical Departments constantly at work.

For Catalogue or other information, address

FRANK ABBOTT, M.D., Dean,

22 West Fortieth Street.

PHILADELPHIA DENTAL COLLEGE

AND

HOSPITAL OF ORAL SURGERY.

Cherry, above Seventeenth Street.

THE COLLEGE TERM begins with the Spring Session, March 1, which Session continues until the last of May. A Fall Session begins on the second Monday in September. The above are auxiliary to the regular course, which commences the first of October and continues until the end of the ensuing February. The lectures at large are so arranged that seven hours of each day may be spent by the student in the laboratory or dispensary on practical work, as this pertains to the every-day duties of a practitioner. Matriculation is made at the beginning of the Spring, Fall, or Winter Session.

The Dispensary and Laboratory are open all the year, except during the summer vacation. Instruction in *Practical Dentistry* is a prominent feature of the institution. This work is under the supervision of an executive committee composed of the practicing dentists of the school, the members of which, aided by competent Demonstrators, give special attention to the interests of students. The Dispensary consists of large, well-lighted rooms, furnished with comfortable operating-chairs, tables, and all conveniences. As an excess of patients is in attendance at the clinics, the opportunities here presented for acquiring a knowledge of clinical dentistry are ample and complete. The new laboratory is the largest of its kind in the country.

A clinic in *Oral Surgery* is held every Saturday at 12 M.

Graduation.—Attendance on three courses of Lectures and satisfactory examinations in theory and practice are required for graduation. **Graduates in Medicine** are eligible for graduation in Dentistry after attendance on Lectures and Clinical Service during two courses. These are excused from examination on Anatomy, Chemistry, Physiology, and Surgery.

Fees.—Tickets for each course, including the Demonstrator's, $100; Matriculation, inclusive of Syllabi for home study, $5 for each course; Examination and Diploma Fee, $25. Board, $4 to $6 per week.

Special Notice.—The examinations for the degree are so divided as to enable the student to take those on Chemistry and progress in Mechanical Dentistry at the end of the first year; on Anatomy and on Physiology at the end of the second year; and on Operative Dentistry, Dental Materia Medica, Anesthesia and Anesthetics, and completion of Mechanical Dentistry, at the end of the third year.

Graduation in Medicine.—Graduates in Dentistry desiring to take the Medical degree complete their studies in the Medico-Chirurgical College.

ROSTER OF LECTURES.

Practical Dental Classes Daily from 9 A.M. to 3 P.M.

Monday,	**3 p.m.—Flagg.**	**4 p.m.—Stellwagen.**	**5 p.m.—Howell.**
Tuesday,	**3 " Flagg.**	**4 " Stellwagen.**	**5 " Guilford.**
Wednesday,	**3 " Clinic.**	**4 " Howell.**	**5 " Garretson.**
Thursday,	**3 " Flagg.**	**4 " Stellwagen.**	**5 " Guilford.**
Friday,	**3 " Dorr.**	**4 " Howell.**	**5 " Garretson.**
Saturday,	**8 a.m.—Guilford; 12 m.—Garretson, Surgical Clinic.**		
Saturday,	**3 p.m.—Operative and Mechanical Clinics by Clinical Instructors of Eminence from Different Parts of the United States.**		

FACULTY.

HENRY MORTON, A.M. PH.D., Emeritus Professor of Chemistry.
C. A. KINGSBURY, M.D., D.D.S., Emeritus Professor of Dental Histology and Operative Dentistry.

S. H. GUILFORD, D.D.S., PH.D., Professor of Operative and Prosthetic Dentistry.
J. FOSTER FLAGG, D.D.S., Professor of Dental Pathology and Therapeutics.
HENRY I. DORR, M.D., D.D.S., Professor of Practice of Dentistry, Anesthetics and Anesthesia.
S. B. HOWELL, M.D., D.D.S., Professor of Chemistry and Materia Medica.
THOMAS C. STELLWAGEN, M.D., D.D.S., Professor of Physiology.
JAMES E. GARRETSON, M.D., D.D.S., Professor of Anatomy and Surgery. Surgeon to the Oral Clinic.

M. H. CRYER, M.D., D.D.S., Chief Assistant of Oral Surgical Clinic.
HENRY C. BOENNING, M.D., Demonstrator of Anatomy.
L. GREENBAUM, M.D., D.D.S., Demonstrator of Chemistry and Materia Medica.
J. W. MOFFITT, D.D.S., Demonstrator of Prosthetic Dentistry.
A. D. GRITMAN, D.D.S., Demonstrator of Prosthetic Dentistry.
R. C. JEWETT, D.D.S., Demonstrator of Operative Dentistry.
JOHN O. ROTHWELL, D.D.S., Demonstrator of Practice of Dentistry.
H. H. BURCHARD, D.D.S., Demonstrator of Crown- and Bridge-Work.

For announcements containing views of college buildings and apartments, together with particulars, address

Dr. JAMES E. GARRETSON, Dean of the Faculty,
1537 Chestnut Street, PHILADELPHIA, or at college.

AMERICAN COLLEGE
OF
DENTAL SURGERY,

78 to 82 State Street, Chicago, Ill.

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E. P. HAZEN, D.D.S., Treasurer.
S. T. BURKE, D.D.S.
I. B. CRISSMAN, D.D.S.

Winter Term Opens September 21, 1891.
Spring Term Opens February 23, 1892.

LADIES ADMITTED TO THIS COLLEGE.

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E. R. BENNETT, }

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DR. GODFREY S. SOLOMON, Chicago, Ill., Special Clinic, Electric Mallet.

FEES.

Spring Term	$25.00
Winter Term	75.00

For desired information, address

I. CLENDENEN, M.D., D.D.S., Secretary,
78 State Street, Chicago, Ill.

COLLEGE OF DENTISTRY,

University of California.

SAN FRANCISCO, CALIFORNIA, U. S. A.

The tenth session (1891) begins Monday, April 6, and closes December 31.

There are only two general examinations for entrance, one on Monday, March 30, and another one month later; both held in the College lecture-room, under the superintendence of a competent educator whose services are engaged for this purpose. The established standard is of the same grade as that required for entrance to the High Schools, with the addition of elementary Physics and Chemistry.

Three full courses of study of nine months each are required for graduation.

The courses of study are graded, with examinations at the end of each year.

A course in Microscopic Technic is a requirement in both the Junior and Senior years.

The Infirmary is open all the year round, affording clinical facilities unsurpassed.

The *Practical Course* established by this department will commence January 4, 1892, and continue until June 1. This course is free to students who have had one full term in this College, and is open to practitioners who desire to acquaint themselves with modern methods of Operative and Mechanical technic, including Crown- and Bridge-work, under competent instructors, at a fee of $50.

The Faculty have, at considerable expense, secured the services of Prof. W. Xavier Sudduth for a special course in Embryology, Histology, and Pathology, and have provided a commodious and well-equipped Physiological Laboratory for Microscopic work under his direction.

The eleventh session (1892) will begin on Monday, June 6, and close March 1, 1893, after which the regular sessions of this College will begin the first Monday in September of each year, and close May 31 following.

For further information, address

L. L. DUNBAR, Dean,
500 Sutter Street,

or to **COLLEGE OF DENTISTRY,**
18 Taylor Street, San Francisco, Cal.

Pennsylvania College of Dental Surgery,

Twelfth Street, between Market and Arch, corner Filbert.

THIRTY-SIXTH ANNUAL SESSION, 1891-92.

OPENS OCTOBER 1, 1891.

FACULTY AND AUXILIARY INSTRUCTORS.

J. EWING MEARS, A.M., M.D., Professor of Anatomy and Surgery.

C. N. PEIRCE, D.D.S., Professor of Dental Physiology, Dental Pathology, and Operative Dentistry.

WILBUR F. LITCH, M.D., D.D.S., Professor of Prosthetic Dentistry, Materia Medica, and Therapeutics.

HENRY LEFFMANN, M.D., D.D.S., Professor of Chemistry and Metallurgy.

ALBERT P. BRUBAKER, M.D., D.D.S., Professor of Physiology and General Pathology.

ALONZO P. BEALE, D.D.S., Lecturer and Demonstrator of Prosthetic Dentistry.
PERCIVAL E. LODER, M.D., D.D.S., Demonstrator of Anatomy.
G. W. WARREN, D.D.S., Chief of the Clinics and Demonstrator of Operative Dentistry.
I. N. BROOMELL, D.D.S., Demonstrator of Prosthetic Dentistry.
ALEX. P. LONG, D.D.S., Demonstrator of Operative Dentistry.
E. T. DAVIS, D.D.S., Demonstrator of Operative Dentistry.
WILLIAM BEAM, A.M., Demonstrator of Chemistry.
J. HOWARD GASKILL, D.D.S., Demonstrator of Prosthetic Dentistry.
FREDERICK R. BRUNET, D.D.S., Demonstrator of Prosthetic Dentistry.
I. V. MERSHON, D.D.S., Demonstrator of Operative Dentistry.
E. A. KRETSCHMAN, Demonstrator of Modeling.
W. K. THORPE, D.D.S., Demonstrator of Operative Dentistry.

CLINICAL INSTRUCTORS.

Dr. F. M. DIXON,
Dr. J. N. FARRAR,
Dr. W. G. A. BONWILL,
Dr. A. L. NORTHROP,
Dr. C. PALMER,
Dr. R. H. SHOEMAKER,
Dr. CHAS. F. BONSALL,
Dr. C. S. STOCKTON,
Dr. T. F. CHUPEIN,
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Dr. J. HAYHURST,
Dr. J. G. TEMPLETON,
Dr. W. R. MILLARD,
Dr. JOHN B. WOOD,
Dr. C. E. FRANCIS,
Dr. E. C. BAXTER,
Dr. A. H. BROCKWAY,
Dr. A. B. ABELL,
Dr. R. HOLLENBACK.

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1891-92, which can be procured from the Dean.)

THE SPRING AND FALL SESSIONS.

THE SPRING COURSE commences on the second Monday in March and continues until the first of July. Fee, $50, which will be credited upon the fee for the regular session.

THE FALL COURSE will commence on Tuesday, September 1, and continue until the first of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupilage under a private preceptor.

THE REGULAR SESSION

Will commence on October first, and continue until the first of March ensuing. Twenty lectures will be delivered each week on the various branches taught.

CLINICAL PRACTICE.

Lecture hours excepted, general clinical practice is available for the student continuously through the day, ten months of the year. Competent instructors are always present.

GRADUATION IN MEDICINE.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in four years. Students desiring to graduate in medicine are required to notify the Dean of their intention at the beginning of their second course.

FEES.

Matriculation (paid but once)	$5.00
For each Course (Demonstrators' Ticket included).	100.00
Dissecting Fee	10.00
Diploma Fee	30.00

Board can be obtained at from $4.00 to $6.00 per week.

The Instruments and Tools required can be procured for from $35.00 to $45.00. This sum does not include the price of dental engine.

For further information, address

C. N. PEIRCE, D.D.S., Dean, 1415 Walnut St., Philadelphia.

BOSTON DENTAL COLLEGE

563 TREMONT STREET.

1890-91.

FACULTY.

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STEPHEN P. SHARPLES, S.B., Professor of Chemistry, Physics, and Metallurgy.
CHARLES P. PENGRA, Ph.C., M.D., Professor of Dental Histology and Microscopy.
EDWARD W. BRANNIGAN, D.D.S., Professor of Clinical Dentistry.
JOS. KING KNIGHT, D.D.S., Professor of Dental Art and Mechanism.
GEORGE F. EAMES, M.D., D.D.S., Professor of Pathology and Therapeutics.
HERBERT L. SMITH, A.B., M.D., Professor of Principles and Practice of Surgery.
JAMES H. DALY, D.D.S., Professor of Operative Dentistry.

EDWARD W. BRANNIGAN, D.D.S., Professor in Charge.

CLINICAL INSTRUCTORS.

E. V. McLEOD, D.D.S.
S. C. INGRAHAM, D.D.S.
WM. RICE, D.D.S.
F. M. HEMENWAY, D.D.S.
J. B. GILLON, D.D.S.
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R. A. PARSONS, M.D., Lecturer on Materia Medica.
WILLARD A. CURRIE, D.D.S., Instructor in Carving.
STEPHEN P. SHARPLES, S.B., Librarian.

The year begins on the second Monday in September, and ends on the third Wednesday in June.

It is the object of the Faculty to present a complete course of instruction in the theory and practice of Dentistry, and for this purpose a well-appointed laboratory and infirmary are provided, at which there is an ample number of patients, insuring to all students abundant opportunities for operating at the chair and becoming by actual practice familiar with all the operations demanded of the dentist.

The Laboratory and Operating Room will be open at 9 o'clock A.M. Demonstrators will be present daily during working hours.

Students who began their professional studies elsewhere may be admitted to advanced standing. No student may advance with his class or be admitted to advanced standing until he has passed the required examinations on the studies of the previous year.

Every candidate for the degree must have passed a satisfactory examination in every one of the departments of dental instruction at regular periods of the College course.

The annual examinations will be conducted by a Board of Examiners. All candidates for admission are required before examination to produce certificates of good moral character, and students from other colleges are required to bring certificates from those colleges of honorable dismission. For admission they must present a degree in letters, science, or medicine from a recognized college or scientific school, or pass an examination in the following subjects:

1.—ENGLISH. Every candidate will be required to write legibly and correctly an English composition, and also to write English prose from dictation.

2.—PHYSICS. A competent knowledge of physics. (See Balfour Stewart's "Elements of Physics.")

Candidates from foreign countries must be able to speak the English language, and must present certificates of pupilage or length of practice, duly legalized by the authorities.

FEES AND EXPENSES.

For Matriculation	$5.00
For a year	100.00
For Demonstrator's Ticket (Anatomy)	5.00

There is no Diploma Fee, and no Fee for Graduation.

For further information, address

J. A. FOLLETT, M.D., Dean,

Hotel Nightingale, 637 Dudley St., Boston, Mass.

The Baltimore College of Dental Surgery,

Chartered by the Legislature of Maryland in 1839.

THE OLDEST DENTAL COLLEGE IN THE WORLD.

FACULTY.

RICHARD B. WINDER, M.D., D.D.S., Professor of Dental Surgery and Operative Dentistry.
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WM. B. FINNEY, D.D.S., Professor of Dental Mechanism and Metallurgy.
B. HOLLY SMITH, M.D., D.D.S., Professor of Special Anatomy and Dental Materia Medica.
THOMAS S. LATIMER, M.D., Professor of Physiology.
JAMES E. LINDSAY, M.D., Professor of Chemistry.
CHARLES F. BEVAN, M.D., Clinical Professor of Oral Surgery.
J. W. CHAMBERS, M.D., Professor of Anatomy.
RICHARD GUNDRY, M.D., Professor of Materia Medica.

LECTURERS.

WM. F. SMITH, A.B., M.D., Regional Anatomy.
J. N. FARRAR, M.D., D.D.S., Irregularities.
J. MEYER, D.D.S., Continuous-Gum.
DR. GEORGE EVANS, Crown- and Bridge-Work.
DR. K. C. GIBSON, Artificial Palates and Fractured Maxillaries.

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A. L. NORTHROP, D.D.S.	N. Y.	JOHN ALLEN, D.D.S.	N. Y.
CHAS. R. BUTLER, D.D.S.	Ohio.	R. B. DONALDSON, D.D.S.	D. C.
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DAVID GENESE, D.D.S.	Md.	C. L. ALEXANDER, D.D.S.	N. C.

DEMONSTRATORS.

R. BAYLY WINDER, Jr., Phar. G., D.D.S., Demonstrator of Operative Dentistry.
W. G. FOSTER, D.D.S., Demonstrator of Mechanical Dentistry.

ASSISTANT DEMONSTRATORS.

GEORGE E. HARDY, M.D., D.D.S.
W. W. DUNBRACCO, D.D.S.
J. W. SMITH, D.D.S.
G. MARSHALL SMITH, D.D.S.
J. E. ORRISON, D.D.S.
W. S. TWILLEY, D.D.S.
J. S. SUTHERLAND, D.D.S.

J. H. BRANHAM, M.D., Demonstrator of Anatomy.
LOUIS F. ANKRIM, M.D., Assistant Demonstrator of Anatomy.
R. G. DAVIS, M.D., Assistant Demonstrator of Anatomy.
W. F. SMITH, A.B., M.D., Assistant Demonstrator of Anatomy.

The Baltimore College of Dental Surgery, the first, and for many years the only dental school, offers facilities for the study of dentistry proper such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building, and carefully studied curriculum, give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far out-ranking all other colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large, and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The Infirmary is open all the year, students paying an entrance fee, which is deducted from those of the regular succeeding course.

The session begins October 1, closing in March. A large corps of demonstrators, always present, put in actual practice the teachings of all lecturers in dentistry—leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but one session at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M.D. (See Catalogue.) In accordance with the resolutions adopted by the National Association of Dental Faculties, which go into effect for the session of 1891 and 1892, the qualifications for entering the first year's course are a preliminary examination in the ordinary English branches.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College; as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior class.

BENEFICIARY STUDENTS.—Each State Dental Society is privileged to send one Beneficiary Student to this College at one-half the regular fees. This has been for some years an established feature of this College.

FEES.—Matriculation (paid once only), $5.00. Tuition fees, $100.00. Diploma fee, $30.00. Dissecting fee, $10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

Prof. R. B. WINDER, Dean,
No. 716 Park Avenue, Baltimore, Md.

Harvard University, Dental Department.

BOSTON, MASS., 1891-92.

FACULTY.

CHARLES W. ELIOT, LL.D., President.
THOMAS H. CHANDLER, D.M.D., Dean, and Professor of Mechanical Dentistry.
DAVID W. CHEEVER, M.D., Professor of Surgery.
HENRY P. BOWDITCH, M.D., Professor of Physiology.
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CHARLES A. BRACKETT, D.M.D., Professor of Dental Pathology.
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JERE E. STANTON, M.D., D.M.D., Instructor in Oral Anatomy, Physiology, and **Bacteriology.**

OTHER INSTRUCTORS.

FREDERIC E. BANFIELD, D.M.D., Instructor in Operative Dentistry.
FOREST G. EDDY, D.M.D., Instructor in Operative Dentistry.
WALDO E. BOARDMAN, D.M.D., Instructor in Operative Dentistry.
GEORGE H. MONKS, M.D., Instructor in Surgical Pathology.
GEORGE L. WALTON, M.D., Instructor in Neurology.
VIRGIL C. POND, D.M.D., Instructor in Operative Dentistry.
EDWARD E. HOPKINS, D.M.D., Instructor in Crown- and Bridge-Work.
CHARLES P. WORCESTER, M.D., Instructor in Dental Chemistry.
HENRY W. GILLETT, D.M.D., Instructor in Operative Dentistry.
HENRY L. UPHAM, D.M.D., Instructor in Operative Dentistry.
CHARLES H. TAFT, A.B., D.M.D., Instructor in Operative Dentistry.
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GEORGES A. BROUILLET, D.M.D., Assistant Demonstrator of Operative Dentistry.
CHARLES E. PERKINS, D.M.D., Assistant Demonstrator of Operative Dentistry.
WM. P. COOKE, D.M.D., Clinical Lecturer in Operative Dentistry.
DWIGHT M. CLAPP, D.M.D., Clinical Lecturer in Operative Dentistry.
WILLIAM H. POTTER, A.B., D.M.D., Clinical Lecturer in Operative Dentistry.

The Twenty-fourth Annual Session of this school begins Oct. 1, 1891, and ends June 29, 1892, with a recess of one week at Christmas, and another in April, making a school-year of nine months of practically continuous work.

General Anatomy, by Dr. Thomas Dwight; *Physiology*, by Dr. H. P. Bowditch; and *General Chemistry*, by Dr. Wm. B. Hills, together with ample dissecting under able demonstrators, are the studies of the first year, and are identical with those of the Harvard Medical School. The studies for the second year are Operative and Mechanical Dentistry, Materia Medica and Therapeutics, Oral Surgery, and Surgical Pathology. Of the third year the studies are Operative and Mechanical Dentistry and Orthodontia. Attention is called to the fact that *twenty-seven months* of progressive instruction compose the required three years in the school.

All applicants for advanced standing must pass the examinations of the years they desire to omit, or furnish proof that they have passed *equivalent* examinations.

At the end of each year written and oral examinations test the student's knowledge, and he must pass satisfactorily in a majority of the studies of each year before he can pass on to the next year's class.

To those wishing to take the medical degree the first year of this school is allowed in the Medical School of the University, after passing the required entrance examinations.

The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon all who fulfill the requirements.

The diploma is accepted by the English Board of Registration under the new Dental Act, so that graduates of this school, *not British subjects*, can practice dentistry in Great Britain without further examination.

Graduates of recognized dental schools will be admitted to the courses of Operative and Mechanical Dentistry on payment of $50 each, or $100 for both, for the whole or any portion of the academic year.

FEES.

There are no fees for matriculation, nor for the diploma, nor for the demonstrators. For the first year a student is a member of the school the fee is $200, payable in two installments of $120 and $80; for the second year, $150, in two payments of $100 and $50; for any subsequent year, $50. For information and announcements address

THOMAS H. CHANDLER, Dean,
161 Newbury Street, Boston, Mass.

ESTABLISHED 1845.

Ohio College of Dental Surgery.

DEPARTMENT OF DENTISTRY—UNIVERSITY OF CINCINNATI.

SESSION 1891-92.

FACULTY.

J. S. CASSIDY, M.D., D.D.S., Professor of Chemistry and Materia Medica.
H. A. SMITH, D.D.S., Dean of The Faculty, Professor of Operative Dentistry and Dental Pathology.
C. M. WRIGHT, D.D.S., Professor of Physiology and General Pathology.
WM. KNIGHT, M.D., D.D.S., Professor of Anatomy and Oral Surgery.
GRANT MOLLYNEAUX, D.D.S., Professor of Mechanical Dentistry and Metallurgy.

C. I. KEELY, D.D.S.,
Lecturer on Irregularities of the Teeth.

L. E. CUSTER, D.D.S.,
Lecturer on Anæsthetics and Obtundents.

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J. E. BARRICKLOW, D.D.S., A. O. ROSS, M.D., D.D.S.,
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Demonstrators of Operative Dentistry.

H. T. SMITH, D.D.S.,
Demonstrator of Analytical Chemistry.

H. C. MATLACK, D.D.S.,
Demonstrator of Anatomy.

MAX J. H. MARTIN,
Demonstrator of Mechanical Dentistry.

The Forty-sixth annual session begins Thursday, October 1, 1891.

FEES.

Freshman Year			
Matriculation	$5.00	Professors' Tickets	$75.00
Junior Year		Senior Year	
Professors' Tickets	$75.00	Professors' Tickets	$75.00
Dissecting Ticket	10.00	Graduation Fee	25.00
Analytical Chemistry	10.00		

For further information and Announcements, address
H. A. SMITH, D.D.S., Dean
or **H. T. SMITH, D.D.S., Secretary,**
128 Garfield Place, CINCINNATI, O.

Louisville College of Dentistry.

Dental Department of the Central University of Kentucky.

324 E. Chestnut Street, Louisville, Ky.

The sixth annual graduating session of this College commences January 4, 1892, and closes July 1, 1892. The fall term of three months (unofficial) opens October 1, 1891.

To those who wish to pass the fall, winter, and spring in a climate free from the severe cold of the Eastern, Northern, and Northwestern States, this College offers unusual advantages. No student can matriculate after twenty days from the advertised opening.

The course of study in this College is thorough in all respects, embracing all studies taught in the best colleges in the country. In addition to this, the dental student has the privilege of attending all the clinics and lectures of the "Hospital College of Medicine" without extra charge.

For further information, address

JAS. LEWIS HOWE, Dean, Louisville, Ky.

UNIVERSITY OF MICHIGAN.

COLLEGE OF DENTAL SURGERY.

The seventeenth annual session begins October 1, 1891, and closes June 25, 1892.

The preliminary examination will be held Wednesday, September 30, 1891.

Three full courses of study of nine months each are required for graduation.

The fees, which must be paid in advance each year, are, for non-residents of Michigan, $60 first year; $35 second year; $45 third year. These fees cover all expenses of tuition, but not of material consumed by students in laboratory courses.

The annual announcement, containing full particulars, will be sent to anyone addressing a request to

J. TAFT, Dean,

Ann Arbor, Michigan.

CHARLES ABBEY & SONS,

MANUFACTURERS OF

DENTISTS' FINE GOLD FOIL,

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ALL our Gold Foil is manufactured from ABSOLUTELY PURE GOLD, prepared expressly for the purpose, with great care, by ourselves.

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Thirty-Sixth Street and Woodland Avenue, Philadelphia.

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James Truman, D.D.S., Professor of Dental Pathology, Therapeutics, and Materia Medica.
Joseph Leidy, M.D., LL.D., Professor of Anatomy.
Theodore G. Wormley, M.D., LL.D., Professor of Chemistry.
Edward T. Reichert, M.D., Professor of Physiology.
George A. Piersol, M.D., Professor of Normal Histology.
John Marshall, M.D., Nat. Sc. D., Assistant Professor of Chemistry.

Robert Huey, D.D.S., Lecturer on Operative Dentistry.
Edward C. Kirk, D.D.S., Lecturer on Operative Dentistry.
John D. Thomas, D.D.S., Lecturer on Nitrous Oxide.

CLINICAL INSTRUCTORS.

Dr. C. S. Beck.
Dr. H. C. Longnecker.
Dr. W. G. A. Bonwill.
Dr. W. R. Millard.
Dr. E. H. Neall.
Dr. H. C. Register.
Dr. Geo. W. Klump.
Dr. R. R. Underwood.
Dr. I. F. Wardwell.
Dr. J. A. Woodward.

DEMONSTRATORS.

William Diehl, D.D.S., Demonstrator of Operative Dentistry.
Joseph W. White, D.D.S., Assistant Demonstrator of Operative Dentistry.
James E. Loder, D.D.S., Assistant Demonstrator of Operative Dentistry.
J. E. Dunwoody, D.D.S., Assistant Demonstrator of Operative Dentistry.
Chas. A. E. Codman, D.D.S., Assistant Demonstrator of Operative Dentistry.
Luther M. Weaver, D.D.S., Assistant Demonstrator of Operative Dentistry.
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Ambler Tees, Jr., D.D.S., Assistant Demonstrator of Mechanical Dentistry, and Demonstrator of Continuous-Gum work.
Frederick W. Amend, Jr., D.D.S., Assistant Demonstrator of Mechanical Dentistry.
R. Hamill D. Swing, D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Milton N. Keim, Jr., D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Horace McCanna, D.D.S., Assistant Demonstrator of Mechanical Dentistry.
John G. Fuller, D.D.S., Assistant Demonstrator of Mechanical Dentistry.
Frederic A. Peeso, D.D.S., Demonstrator of Crown- and Bridge-work.
James G. Lane, D.D.S., Assistant Demonstrator of Crown- and Bridge-work.
John B. Deaver, M.D., Demonstrator of Anatomy.

The appointments of the Lecture-Rooms, Operating-Room, and Laboratories are the most complete in America.

The belief entertained when the Dental Department was started that the facilities for obtaining a supply of clinical patients were ample, has been fully realized, and owing to the unequaled accommodations and appointments of the new operating-room, the daily applications are now largely in excess.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry and Histology, forms a prominent feature in the Department of Dentistry.

FEES.

Matriculation Fee (paid once only)	$5.00	Dissecting Fee (Second year)	$10.00
Fee for One Course of Lectures	100.00	Graduation Fee (Third year)	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations. In locations near the college, students generally pay about five dollars per week.

Students of the Dental Department have access without additional charge to all the other lectures and clinics in the Medical Department.

Surgical clinics at University Hospital twice a week; at Philadelphia Hospital, contiguous to the grounds of the University, Wednesday and Saturday.

University of Pennsylvania.—Dental Department.

The dental department possesses the means for thorough training, both theoretical and practical, not surpassed, it is believed, by any other institution. The operating-room is 151 feet in length by 46 feet in width, and lighted by windows on all sides. In front of each window is placed a Morrison Chair, a handsome nickel-plated movable bracket, and a neat walnut table Battery wires are arranged to a number of the chairs for the use of electric pluggers.

The Mechanical Laboratory is supplied with all the modern appliances, and is under the care of an able and experienced mechanician. Special clinics will be given in continuous-gum and crown- and bridge-work.

The extensive Chemical Laboratories are under the charge of a demonstrator well qualified to meet all the requirements of his position.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

THE REGULAR OR WINTER SESSION.

The session will commence October 1, and ends at Commencement, early in May. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, and to fully employ the student's time, the regular winter sessions are so arranged that the first-course student is required to devote the morning hours equally between *dental, histological, and chemical laboratory work.*

During the second and third years the student has the entire forenoon of each day for practical dental work. Ample opportunity is afforded for practice in operative and mechanical dentistry. In the latter branch, the students of the first year are divided into sections, thus devoting the time not otherwise engaged to practice in the operative and mechanical rooms.

It is believed that this plan of *grading the course*, and of affording the first-year student an opportunity of coming forward for examination in the branches of chemistry, histology, and materia medica, and the second-year student upon anatomy and physiology, will not only prove an economical arrangement of his time, but will really facilitate his labors in the acquirement of knowledge in the remaining branches.

PLAN OF EXAMINATIONS.

Attendance upon three regular winter courses of lectures will be required before the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, examinations are held in *chemistry, histology, and materia medica*, and the second year upon *anatomy* and *physiology*. If the student is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the close of the third year is in *operative dentistry, mechanical dentistry, metallurgy, dental pathology and therapeutics*.

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed *equivalent* examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

CONDITIONS OF ADMISSION.

Candidates for admission are required: *First*, to write an essay (not exceeding a page of foolscap) as a test of orthography and grammar. *Second*, to pass an examination in the English branches, viz: grammar, arithmetic, history, and geography.

A candidate who has received a collegiate degree or passed the matriculate examination of a recognized college, or who has a certificate from a normal, high, or grammar school, or a teacher's certificate properly attested, may enter without examination.

For information and announcements address

JAMES TRUMAN, D.D.S.,
Dean of the Dental Faculty, 3243 Chestnut Street,
PHILADELPHIA, PA

COLLEGE OF DENTISTRY.

Department of Medicine. University of Minnesota.

FACULTY.

Cyrus Northrop, LL.D., President.

W. Xavier Sudduth, A.M., M.D., D.D.S., Secretary and Professor of Pathology and Oral Surgery.

Thomas E. Weeks, D.D.S., Professor of Operative Dentistry and Dental Therapeutics.

Charles M. Bailey, D.M.D., Professor of Prosthetic Dentistry and Metallurgy.

Edward H. Angle, D.D.S., Professor of Histology, Comparative Anatomy, and Orthodontia.

George A. Hendricks, M.S., M.D., Professor of Anatomy.

Richard O. Beard, M.D., Professor of Physiology.

C. J. Bell, A.M., Professor of Chemistry.

H. M. Bracken, M.D., L.R.C.S.E., and William E. Leonard, A.B., M.D., Professors of Materia Medica and Therapeutics.

F. E. Twichell, D.M.D., Demonstrator in charge of the Prosthetic Clinic and Instructor in Continuous-Gum Work.

Hugo E. Wangelin, M.D., D.D.S., Instructor in Technics.

Chas. A. VanDuzee, D.D.S., Instructor in Operative Technics.

J. D. Jewett, D.D.S., Instructor in the Administration of Anæsthetics.

ANNOUNCEMENT.

The fourth year of instruction will commence Tuesday morning, October 6, 1891, and continue eight months. There will be no lectures Thanksgiving day, Washington's Birthday, or Good Friday. The holiday vacation begins December 19 and closes January 3.

Examinations for promotion and degrees in the Dental Department begin May 18, 1892.

REQUIREMENTS FOR ADMISSION.

Applicants for admission to the College of Dentistry will be required to prove their fitness to enter the college:

1. By writing legibly and correctly an English composition of not less than two hundred words.
2. By evincing reasonable familiarity with Latin Grammar or passing an examination in either French, German, or one of the Scandinavian languages.
3. By passing an examination upon either the elements of Algebra, Plane Geometry, or Botany.
4. By passing an examination in Elementary Physics.

It is provided, however, that students, matriculates, or graduates of reputable colleges of Science, Literature, and Arts, or graduates of High Schools of the first grade, shall be exempt from the provisions of this examination. Applicants are given one year to make up a condition in the entrance examination.

PRELIMINARY COURSE.

(OPTIONAL.)

A preliminary course has been established for a class of students who find themselves unprepared to pass the examination required for entrance into the regular college course.

The *manual training* part of the course will be thorough, and will have a direct dental tendency. In this respect it is better suited to the needs of dental students than the manual training departments of high schools.

The requirements for admission to the *Preliminary course* are properly certified marks from some school or a written examination in arithmetic complete, English composition, which will consist of an essay of not less than two hundred words, on some subject assigned at the time of examination, and U. S. History to the close of the Revolutionary war.

FEES.

Matriculation fee, payable annually, for students who are actual residents of Minnesota, $10.00; for all others, $25.00.

Lecture courses, annually, for students of Minnesota, $25.00; for all others, $35.00.

Material for dissection, $10.00 per part.

Histological laboratory course, $5.00 for each course.

Graduation fee, $10.00.

W. XAVIER SUDDUTH, Secretary,
Cor. Sixth St. and Ninth Ave. S., Minneapolis, Minn.